MAY 1941 Thirty-Five Cents Per Copy

Coal Age

Volume 46 Number 5

Axiomatic is the fact that loading machines work efficiently only when provided with good transportation. At Little Betty mine in Indiana, 6-ton cars, two-locomotive changing, and keeping changing points close enable loaders to average 500 to 600 tons per shift in 6-ft. coal. The complete story is scheduled for an early issue. . . . **One every decade** has been the Clayton Coal Co.'s record to date on new Colorado mines. Latest in the list is the Washington mine, p. 59, where the 435-ft. shaft was sunk in 70 days and shaker conveyors, carbon dioxide and hydraulic breaking are used underground. Special provisions for truck shipments were made in the design of the completely modern preparation plant, p. 61. . . . **A big car's** advantages are granted, but on what do they rest? The answer to this question is supplied by a recent installation of 198-cu.ft. units at

(CONTINUED ON PAGE 7)

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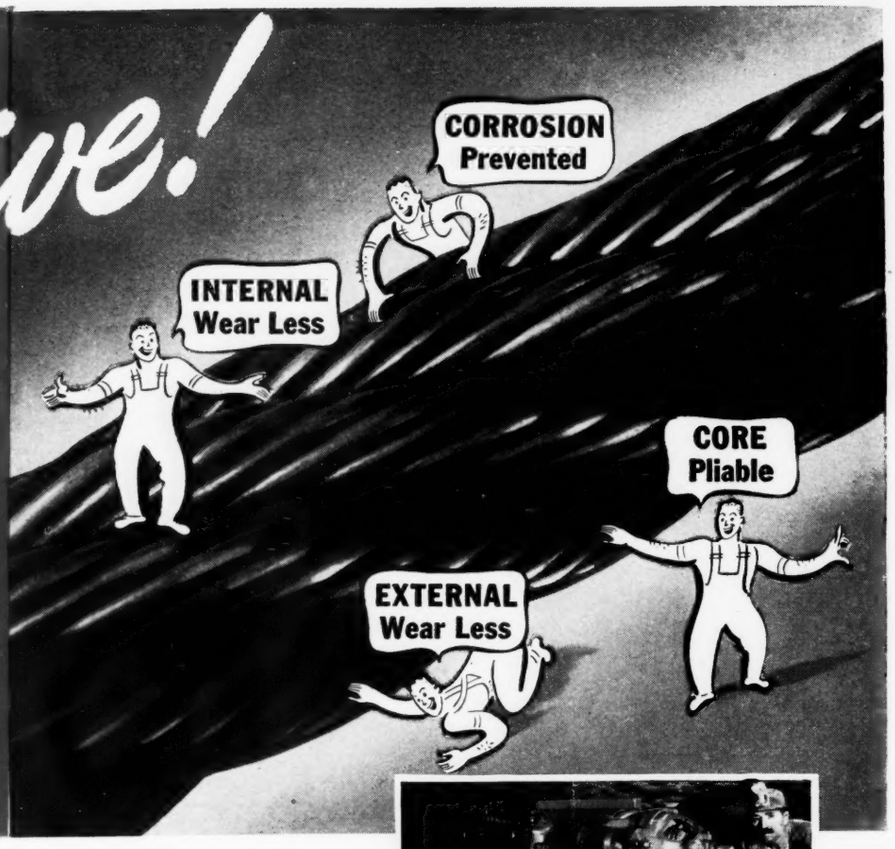
COAL AGE (with which is consolidated "The Colliery Engineer" and "Mines and Minerals") is published monthly on the 1st. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42d Street, New York, N. Y.

Subscription rates: United States, Canada, Mexico, Central and South America, $3 for one year, $4 for two years, $5 for three years. Great Britain and British Possessions, 30 shillings for one year, 60 shillings for three years. All other countries, $5 for one year, $10 for three years. Single copies, 35 cents each. Entered as second-class matter Oct. 14, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in the U. S. A. Cable Address: "McGraw-Hill, N. Y." Member A.B.P. Member A.B.C.

Alive! IN ALL ITS MOVING PARTS



BENDING around sheaves on the mine hoist, or dragging through sulphur-laden ground water, every wire in every strand of this wire rope is free to move . . . *alive* . . . fully protected against wear, weather, rust and corrosion.

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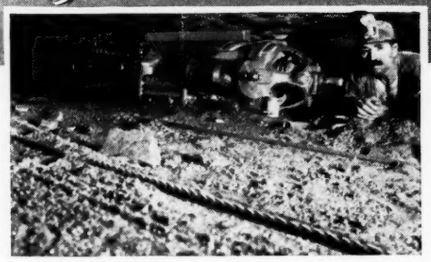

DRAGGING through dirt or water on the mine floor, wire rope needs extra tough protection . . . gets it with *Texaco Crater.*

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FOR THE COAL MINING INDUSTRY

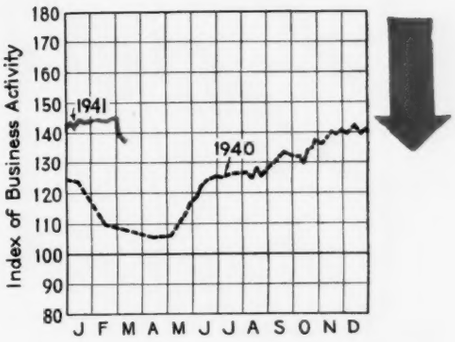
(CONTINUED FROM PAGE 5)

Pittsburgh Coal Co. mine. How their design has increased loading-machine output, raised tons per man and cut costs will be analyzed by V. D. Hanson in an early issue. . . . **Holding mine roof,** controlling dust, and stirring up an interest among employees are major safety and operating problems. Paint, gunite and conditioned air to protect the top; water and wetting agents for allaying dust, and education to promote safety therefore were natural topics at the Western Pennsylvania Safety Engineering Conference. For the meat of the eleven papers, see p. 80. . . . **Smoke abatement** was the subject of another meeting covered by the Coal Age editors in April. What the Division of Gas and Fuel Chemistry of the American Chemical Society thought of smokeless coal, smaller sizes, better preparation, processed coals, fuels other than coal, and electrostatic precipitation of dust is summarized on p. 84. . . . **Efficient mobile-loader** operation is not necessarily dependent on good conditions. Industrial mine, in Colorado, for example, averages 13 tons per man underground in barrier recovery under bad conditions with one loader and two shuttle cars. Details are scheduled for an early issue. . . . **Post-Convention Note:** For a complete report on the meetings and exposition of coal-mining equipment at the 18th annual American Mining Congress Convention, see the June issue of *Coal Age*.

HOW'S BUSINESS

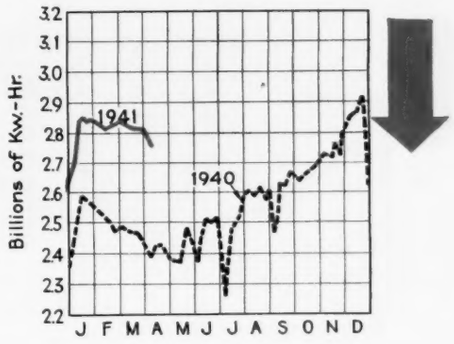
GENERAL BUSINESS CONDITIONS

The *Business Week* Index showed a decline as of April 19 of seven points from its March high of 144.9 to 137.9. Instead of indicating a permanent lowering of the level of industrial operations, however, it reflects the stoppage in coal production and the slump in Ford assemblies. Resumption is expected to put the Index up again—to where the decline started. Shrinkage of coal piles, just the same, is making some industries nervous.



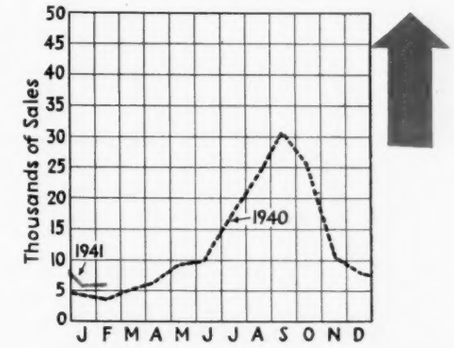
ELECTRICAL POWER OUTPUT

Output of electric energy by the electric light and power industry, according to the Edison Electric Institute, has shown a pronounced decline since registering its second highest level during the first week in March. This is partly seasonal and partly due to strikes in industrial plants. Production figures for recent weeks are: March 15, 2,817,000,000 kw.-hr.; March 22, 2,809,000,000; March 29, 2,802,000,000; April 5, 2,778,628,000; April 12, 2,720,790,000 kw.-hr.



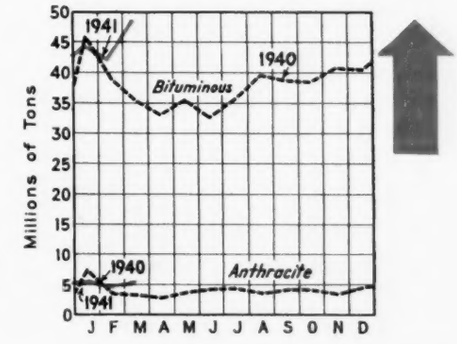
COAL STOKER SALES

Mechanical stoker sales in the United States in February last totaled 5,585 units (U. S. Bureau of the Census from 101 manufacturers), compared with 5,501 in the preceding month and 3,803 in February, 1940. Sales of small units in February last were: Class 1 (under 61 lb. of coal per hour), 4,969 (bituminous, 4,516; anthracite, 453); Class 2 (61-100 lb. per hour), 217 (bituminous, 203; anthracite, 14); Class 3 (101-300 lb. per hour), 222.

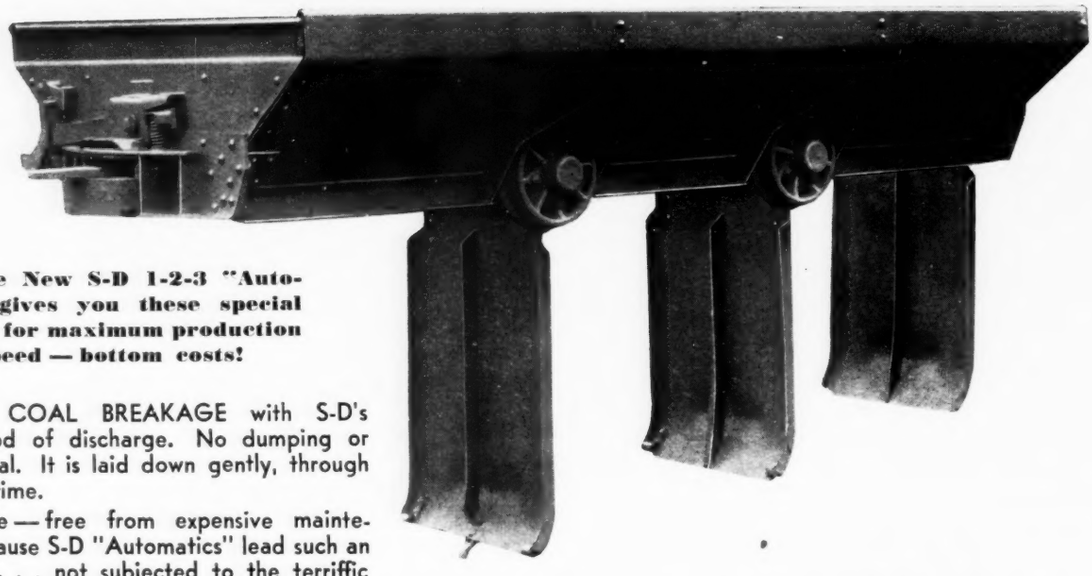


COAL PRODUCTION

Bituminous coal produced by United States mines in March last (preliminary) totaled 48,250,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior, which compares with 41,695,000 tons (revised) in the preceding month and 35,244,000 tons in March, 1940. Anthracite tonnage in March last, according to the U. S. Bureau of Mines, was 4,596,000 (preliminary), against 4,432,000 (revised) in the preceding month and 3,773,000 in March, 1940.



Every second counts...



Only the New S-D 1-2-3 "Automatic" gives you these special features for maximum production — top speed — bottom costs!

1 MINIMUM COAL BREAKAGE with S-D's 1-2-3 method of discharge. No dumping or dropping of coal. It is laid down gently, through one door at a time.

2 Longer life — free from expensive maintenance, because S-D "Automatics" lead such an easy existence . . . not subjected to the terriffic strains of being tilted or turned over for discharging.

3 The only car capable of filling storage bin level full. A great advantage when needed in a tipple emergency or in double or triple shifting.

4 The S-D "Automatic" is supplied with a combination spring bumper and draft gear with only one set of springs. Another example of simplicity in design for less operating trouble and expense.

5 Low sloping sides . . . closeness of body to track, provides greater capacity and minimum height for given dimensions — lower center of gravity—better trackability.

6 Equipped with the S-D "Floater" Ball Bearing Wheels you have the easiest running car wheel the industry has ever known—cuts power costs to the minimum—limits greasing expense to one greasing in 5 years.

7 And now, Sanford-Day's new, automatic and fool-proof unlatching device. Another labor saving feature.

Now, more than ever before—

TIME is MONEY

Ask the operators who have changed over to S-D 1-2-3 "Automatics" and they'll tell you, that before changing, they had no idea the old cars were costing so much in wasted time and maintenance. You may be content with your present transportation costs from mine to tipple, but once you seriously investigate how S-D "Automatics" save in so many ways . . . how, depending on your present operating conditions, you may be able to reduce the number of cars required for your mine by 20 percent and still equal present production, then you'll discover that only with this new car can you even approach maximum production—top speed —bottom costs, for the steady running to meet future demands. Transportation costs from mine to tipple may be the "bottleneck" in profits for you. Don't guess at it . . . you may, without knowing it, need S-D "Automatics." Write Sanford-Day Iron Works, 151 Dale, Knoxville, Tenn.

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MINE CARS, ALL TYPES
TRAILERS · WHEELS · SHEAVES

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.
SYDNEY A. HALE, Editor • MAY 1941

Pertinent and Impertinent

• FUEL PREFERENCES and buying practices of public utilities are significant indices of relative costs and efficiencies. Public-utility coal consumption last year increased 15.6 per cent; consumption of oil and gas declined 4.7 per cent. And 43 out of 78 additions to utility steam plants in 1940 will use coal exclusively; 4 will burn both coal and oil, and 10 of the remaining 31 plants are in areas tributary to oil or gas. Need more be said?

• ADEQUATE power resources play an important part in the over-all defense picture. Because of that, said Dr. Dexter S. Kimball, of OPM, in a recent address before the Atlanta section of the A.S.M.E., it may be advisable to invoke "priority action of some sort," where necessary, to encourage the production of power facilities. If priorities should be used for needed power-plant construction, what shall be said of the production of fuel, without which a steam plant cannot operate?

• WHETHER the new Appalachian wage contract boosts production costs 15 or 25c. per ton, the bituminous industry will not recover the full increase in upward revisions of minimum prices. Increased mechanical mining and better running time since base costs under the Guffey act were determined will see to that. Preliminary figures on 1940 costs, compiled by the Bituminous Coal Division of the Interior Department, show a decrease of 18c. per ton under the average costs upon which present minimum prices are based.

• "A GROUP of coal-mining companies," says the April economic review of the National City Bank, "showed a combined net profit in 1940 against a net deficit in 1939, due to increased demand and somewhat higher average selling prices." Reductions in costs, it might have added, also had a part in this showing.

• WITH THE WAR, sub-collegiate occupational training goes forward in high gear—but not collegiate training in mining. While juniors and seniors appear to be more numerous than before, freshmen and sophomores are fewer and the numbers enrolled in mining student bodies, as a whole, are depleting. The draft, according to President Thompson of the Montana School of Mines, has taken men for the armed services; activity in the defense industries has made others defer their collegiate training.

• SOME FOLKS seem quite confused as to the reason most of the country's bituminous mines were down last month. Very simple really if one analyzes the situation. Northern Appalachian operators and the United Mine Workers were in agreement on the terms of a new wage contract—but the document was unsigned. Southern producers, bolting the Appalachian Joint Wage Conference because their 40c. differential was in jeopardy, were eager to submit all issues to mediation. Northern miners, it was announced, would not work while their Southern brethren were idle; Northern producers were reluctant to reopen their mines unless given positive assurances that the South would not win more favorable terms from the union than the North. President Roosevelt casually suggested that freight rates discriminate against the South. While the mines remained idle, the White House brigade began its biennial charge

against the embattled industry, with Dr. Steelman leading the advance action, Mme. Perkins doing a little sniping and F. D. R. bringing up the heavy guns. What's so confusing about that?

• HAVE YOU any machine tools in your repair shops? Are nickel steels, aluminum, magnesium or tungsten alloys, or synthetic rubbers used in the manufacture of any of the parts of your mining machinery? If so, you have an excellent chance to acquire a liberal education in the OPM priority system the next time you are in the market for replacement parts.

Wake Up, Washington!

"COAL is vital to any soundly conceived national-defense program. The essence of such a program is coordination—coordination of natural resources, manufacturing, transportation facilities and man power. . . . Coal is indispensable to industry. Industry is indispensable to munitions. Munitions are indispensable to victory in war. So the part of coal in the program is plain—and tremendous."

That is the way Louis Johnson summarized the situation a few days before he resigned the post of Assistant Secretary of War last summer. Since then until the April 1 suspension, however, the various defense agencies set up in Washington appear to have proceeded with blissful unconsciousness of the dangers inherent in a curtailed coal supply. And the effects of such a shortage in the last World War.

Recent weeks have seen an increasing output of priority orders limiting the uses of this material and that to industries essential to national defense. Are the requirements of the coal-mining industry considered in these allocations? Not that any cursory reading of these orders discloses. Even if by implication such consideration can be read into some of the blanket provisions, the burden of proof that the equipment is essential is certainly placed on the mining-machinery manufacturer.

A general suspension of production because of a labor dispute is dramatic. But curtailment of output attributable to shortage in manpower or equipment also can be deadly. And the losses in tonnage piled up since April 1 will make any interruptions due to equipment breakdowns or lack of sufficient equipment serious. Why lose precious time waiting for a crisis to develop? Action now to forestall it is much wiser.

What About Clinker?

SHOULD NOT as much stress be laid on clinkering as on ash percentage? What many washery foremen need to know is whether the coal they are delivering is going to clinker in the furnace. For their direction, a quick test to duplicate furnace combustion in the main should be devised. Unfortunately, what is wanted in such a test is a reducing atmosphere, and combustion in such air is slower than in an oxidizing atmosphere. To hurry the reduction, the coal must be crushed somewhat fine. But, if this is done, the coal particles will be mixed and localized presence of low-fusing-ash material will be masked by the mixing—which is not what is wanted.

Natural-Gas Control

AUTHORITY to forbid the building of new natural-gas pipe lines where such construction is not in the public interest is recommended in the 20th annual report of the Federal Power Commission. Amendment to Section 7(c) of the Natural Gas Act is urged to conserve the gas supply and to prevent undue injury to other fuel industries. "Careful study of the entire problem," states the report to Congress, "may lead to the conclusion that use of natural gas should be restricted by functions rather than by areas."

The pending application for a certificate to permit the construction of a 1,500-mile pipe line from Texas to New York City is cited to support the proposed extension of the commission's powers. Involved here is the question whether this invasion of Northeastern States "would not result in displacing a less valuable fuel and create hardships in the industry already supplying the market while rapidly depleting the country's natural-gas reserves."

For some years, it is conceded, the gas might be so priced that it would offer an apparent saving in fuel costs to the consumer. But "this," declares the commission, "would mean simply that social costs which must eventually be paid had been ignored." With this eminently sound conclusion no coal man will disagree. The average consumer, however, can hardly be expected to take this long-range view. So coal, while indorsing the commission's position, must still continue its own drive for lower production costs.

Try the Experiment

BUYERS who think of salesmen only in terms of a free dinner, a rakish story or an easy bridge opponent miss an opportunity. The alert salesman is more than just a "good fellow." He is in a position to know more of what his product will do for his customer than the customer. The fact that the salesman's experience comes from 50 to 100 operations rather than the single one his customer runs gives him a very decided edge. There is also the new or improved product which has not yet been publicly announced. Every salesman is kept posted on such developments so that he can advise his customers.

The customer will be wise to quiz his sales callers on what is new in the industry and what it will do for him. If the salesman doesn't know the answer offhand, he knows where to get it. Most salesmen worth their salt can discuss operating problems with their customers and prospects. Out of their experience come cost-saving suggestions both on new equipment changes and the more effective utilization of equipment already installed. Try your luck on the next salesman.

BIGGER LOADERS

Plus Rubber-Tired Haulage Units Hike Tons Per Man 29 Per Cent at Monarch

An increase of 3.68 tons per man-shift has been marked up at Monarch mine by concentration of operations and wholesale revisions in production equipment and mining methods. Old small-capacity loading machines and mine-car gathering were replaced by big loaders and 10-ton shuttle cars, supplemented by high-capacity shortwalls and rubber-tired drills. Cutting is done with patent bits and the coal is broken with carbon dioxide.

By C. M. SHOTT
General Superintendent
And RAY M. BOTTOMLEY
Chief Engineer
Sheridan-Wyoming Coal Co., Inc.

AFTER an intensive two-year study of modern mining equipment and concentrated mining plans, the management of the Sheridan-Wyoming Coal Co., Inc., decided to purchase new equipment and concentrate all its operations at its Monarch (Wyo.) mine (shipping point, Kleenburn, Wyo.). Orders were placed for late-type mechanized units in the latter part of 1939 for early spring delivery in 1940. This equipment, listed in Table I, displaced Joy 5BU loading machines, standard shortwall cutting machines with 8½-ft. bars and post-mounted drills. Gathering on track gave way to trackless mining.

Mining is in the Monarch seam, in the Fort Union formation, a vein of clean sub-bituminous coal ranging from 18 to 26 ft. in thickness. While the moisture content is high (21.70 per cent), ash and sulphur are low, the ash, on the as-received basis, running 3.15 per cent (4.02 per cent dry basis), and the sulphur 0.38 per cent as-received and 0.49 per cent dry basis. As-received B.t.u. content is 9,460; dry basis, 12,082. Fusion temperature of the ash is 2,258 deg. F.

Monarch mine was opened by driving triple-heading main entries, from which cross entries are turned alternately right and left. Panel entries (two headings) are turned off the cross entries and driven to the panel boundary, after which 24-ft.-wide rooms are mined on the retreat. As Monarch mine was opened in 1916, the shortest main-line haul now is 2 miles.

Adoption of new equipment, the management realized, required a new layout. The first plan is illustrated in Fig. 1. Several months of experience with the new equipment led to the development of a new plan, shown in Fig. 2. This latter plan has eliminated serious congestion in the developing stage, and increasing the size of the pillars has resulted in better pillar work as well as higher extraction. Retreat mining has been made safer and operating cost has been reduced.

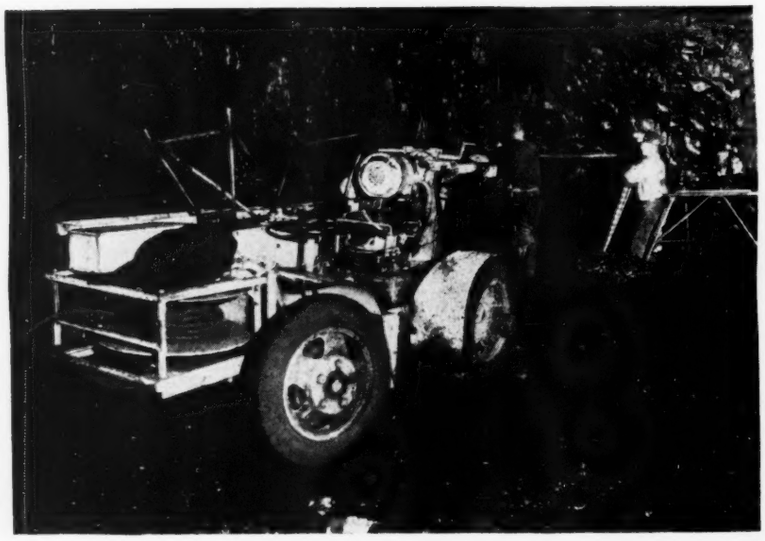
The pillar-recovery plan is illustrated in Fig. 3. It consists essentially of driving through the 34-ft. thick block from one side, leaving fenders about one cut (8 to 10 ft.) thick on either end. If conditions permit, final cuts are made in these fenders, leaving small stumps to crush down or be shot out, if necessary.

Working places at Monarch are cut so as to leave 12 to 15 in. of coal in the bottom to provide a good roadbed for the shuttle cars. The true bottom is a soft fireclay. A natural parting about 10 to 14 ft. up in the seam is used as the divider in room work, and machine men are provided with measuring rods so that they can scale down from the parting to determine the proper level at which to cut. The 7-B shortwalls used are powered with 50-hp. 250-volt d.c. motors.

Chain speed is approximately 600 f.p.m.; cutting speed, 26 in. per minute. Machines are equipped with Bowdil patented chains—seven-position wedge-laced. The two-point alloy-steel bits are gaged for a 5-in. kerf. The cutting machines are transported on the caterpillar trucks. A crew cuts 15 to 18 places in a 7-hour shift. All machines are equipped with hose connections to apply water to the bars while cutting.

The Sullivan drilling machine is mounted on a chassis with rubber tires and is capable of drilling horizontal holes at a height of 10 ft. above the floor a distance of 12 ft. to either side of the chassis. A crew ordinarily drills 100 or more holes 3½ in. diameter and 8½ to 9 ft. deep in seven hours, using Hardsocg conveyor-type augers, heads and bits.

Cardox was adopted for breaking the coal several months in advance of the new mechanization program. The 231-130 cartridge is used, with a 180-gram heater and No. 8 disk. Usual loading is 4 lb. of carbon dioxide per cartridge. The normal room, 24 ft. wide, 8½ ft. high and cut about 8½



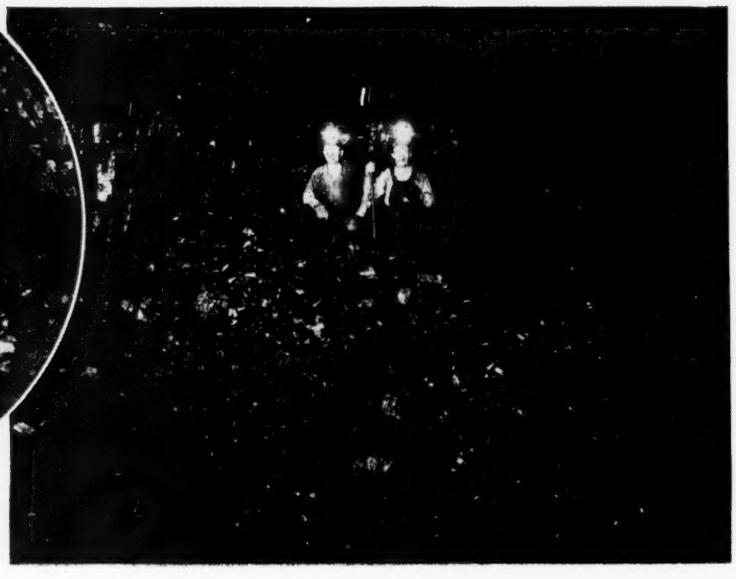
Putting a hole in a room face with a rubber-tired drill.

Placing a carbon-dioxide tube in a room-face hole.

Mine-car loading station with the elevating conveyor and a shuttle car in the background.

Fall of coal at room face.

Cutting a room face with a new super-duty shortwall.



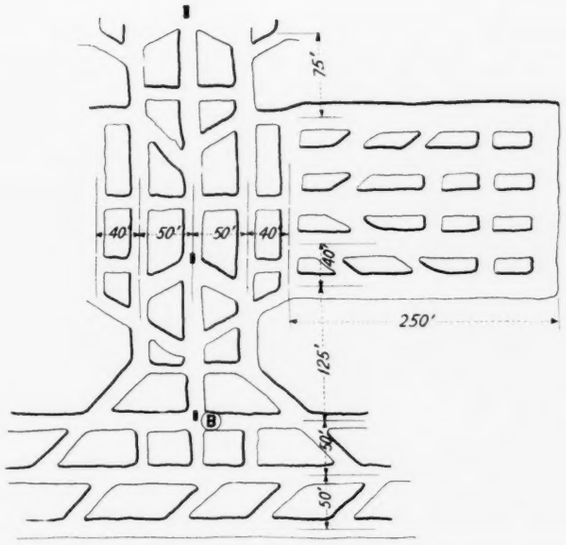


Fig. 1—Initial plan for mining with shuttle cars.

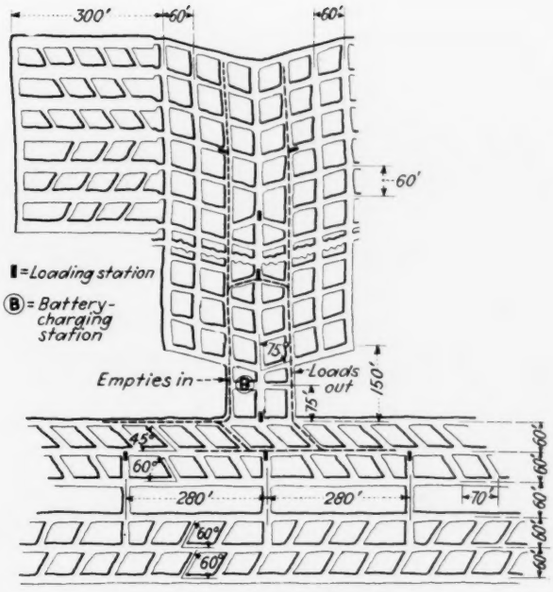


Fig. 2—New plan of mining with shuttle cars.

Table I—Production Equipment Used at Monarch Mine

3 11BU Joy loading machines
6 10-ton 60-D1 Joy shuttle cars with 400-amp.-hr. Exide-Ironclad batteries
3 PL-11-3E Joy elevating conveyors
3 T1-1E Joy caterpillar cutting-machine trucks
3 Sullivan 7-B cutting machines (short-wall type), with 9½-ft. bars
3 Sullivan CD-16 single-spindle rubber-tired power drills
Charging units and other auxiliaries.

Table II—Loading-Machine Performance, October, 1940–February, 1941

	Tons
October, 1940	
3 11BU's (17 days, 102 machine-shifts)	66,952.05
2 5BU's (17 days, 34 machine-shifts)	10,939.85
	77,891.90
November, 1940	
3 11BU's (20 days, 120 machine-shifts)	76,369.20
2 5BU's (20 days, 40 machine-shifts)	10,719.85
	87,089.05
December, 1940	
3 11BU's (18 days, 108 machine-shifts)	67,665.78
2 5BU's (18 days, 36 machine-shifts)	10,561.05
	78,226.83
January, 1941	
3 11BU's (10 days, 60 machine-shifts)	40,320.30
2 5BU's (10 days, 20 machine-shifts)	7,346.80
	47,667.10
February, 1941	
2 5BU's (10 days, 20 machine-shifts)	40,684.55
3 11BU's (10 days, 60 machine-shifts)	7,562.10
	48,246.65

to 9 ft. deep, making about 65 tons of coal, usually is broken with ten holes placed as indicated in Fig. 4. The bottom round is fired first to throw out the lower part of the fall, and followed by the top round. Headings 14 ft. wide usually are broken with six holes.

Each of the 11BU loading machines is served by the two 10-ton shuttle cars. These cars discharge into elevating conveyors (one for each mechanical-mining unit) which deliver coal to trips of mine cars. Time required to transfer coal from the shuttle car to the elevating conveyor ranges from 35 to 55 seconds. Trips of 18 mine cars are pulled past the elevator by a 10-ton trolley locomotive. Movement of trips is controlled by signal lights.

Two 5BU loading machines still are in service in development work and in mining out corners left over from the old plan of operation. The peak output for an 11BU served by shuttle cars has been 1,742.93 tons in a day, made up of 874.73 tons in the first 7-hour shift and 868.20 tons in the second 7-hour shift. The peak daily average output for one loading unit was developed in the month of February and is 736.48 tons per day. All of the above performance is on actual mine operating days, and notwithstanding time deducted for all delays. The tonnage produced by three 11BU and two 5BU machines in the period October, 1940–February, 1941, is shown in Table II. The highest daily average for an 11BU loading machine was in the month of February, 1941—namely, 678.07 tons.

Total production for the months of October, November and December, 1940, and January and February, 1941, was 340,453 tons. The tonnage per man-shift for this period, resulting from the use of Joy 11BU loading machines in conjunction with 10-ton shuttle cars, was 14.84 tons. In 1939 the total production was 535,616 tons. In that year Joy 5BU loading machines were used in conjunction with track gathering. The tonnage per man-shift in 1939 was 11.48 tons. It will be noted that there was a rise in tonnage per man-shift in the October, 1940–February, 1941, period of 3.36 tons, representing an increase of 29 per cent over the average in 1939.

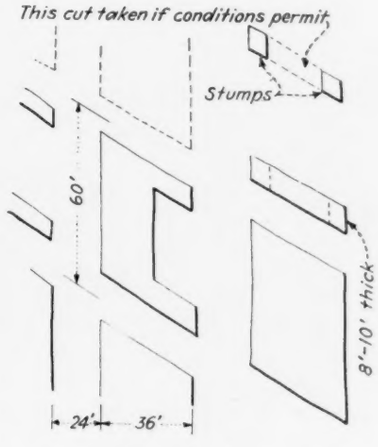


Fig. 3—Pillar-mining plan used at Monarch mine.

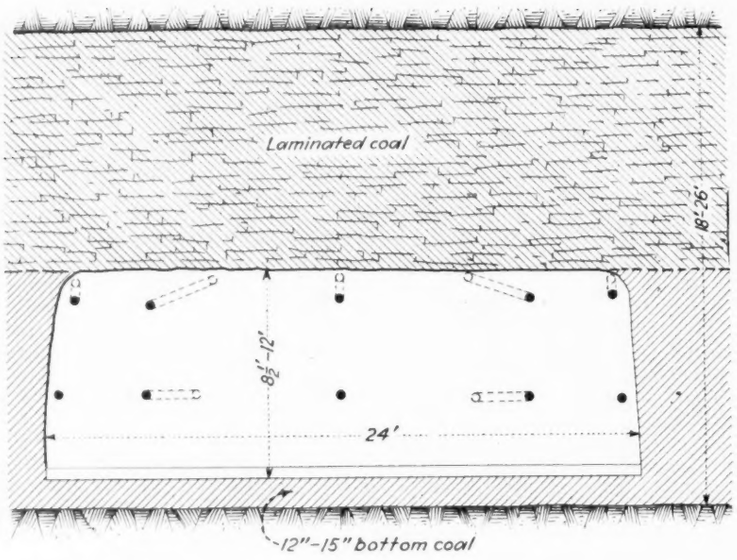


Fig. 4—Drilling pattern for a 24-ft.-wide room, carbon-dioxide coal breaking.

Table III—Tons Per Man-Shift, Monarch Mine

	Loading Machine	Total Inside	Outside	Grand Total
October, 1940	39.1412	20.9510	56.3367	15.3160
November, 1940	39.5067	21.0616	56.0980	15.3167
December, 1940	39.1181	21.4667	51.7902	15.1760
January, 1941	39.8440	21.6029	49.4354	13.3889
February, 1941	39.9021	21.8035	51.6894	14.5684

A unit crew, under the direction of an assistant foreman, is made up as follows: cutting machine operator and helper, 2; drill operator and helper, 2; sprinkler, who flushes drillholes and sprays each fall of coal with water before it is loaded (pipe is laid into every working place); he spends the remainder of the shift sprinkling shuttle-car runways and other passages to keep down dust, 1; shooter (loads and fires Cardox cartridges), 1; service-man—takes charged cartridges to newly drilled places and returns used ones to insulated car on track near the loading head, 1; trimmer—enters each place before sprinkling and the loading crew to trim loose coal from the ribs and roof, 1; loading-machine operator and helper, 2; shuttle-car operators, 2; loading-head operator, who controls elevating conveyor, 1; motorman, who spots mine cars under elevating conveyor on signal from the loading-head operator, 1; bratticeman—maintains ventilation at the face, advancing brattice and curtains, 1; utility man—checks each place ahead of the loading machine, pulling loose coal off the roof and ribs; he scrapes the kerfs and helps the loading crew if it gets into tight coal, 1; mechanic—charges shuttle-car batteries after shift, starting 1½ hours after the regular starting time, 1. Total unit crew, 17.

Two crews work in each section, one on the first and the other on the second shift. The concentrated mining plan, along with modern mechanical equipment, has resulted in an increased output from each section, thereby reducing maintenance, transportation, ventilation, drainage and power costs.

Delbert H. Pape is president of the Sheridan-Wyoming Coal Co., Inc.; J. T. Kessinger, assistant secretary and general manager, and J. T. Hill is sales manager. In addition to the authors, mine operation and surface activities are handled by James Catterall, foreman; S. E. Upton, Frank Day, John Yorio, William Foreman, Joseph Laya and Stanley Laya, assistant foremen; A. K. Perry, master mechanic, chief electrician and outside foreman; and Frank Welch, assistant to Mr. Perry in charge of tipple operation. "Monarch Coal" is the trade name of the product.

Shuttle car getting a 10-ton load of coal.

OKLAHOMA STRIP MINE

Develops Mechanical Pinning Machine And Efficiently Meets Lump Requirements

Spurred by a market demand for clean lump and stoker sizes, Seneca Coal & Coke Co. has developed unusual methods for breaking and extracting the 18-in. seam. The entire 1,750-tons-per-shift output is broken by two mechanical pinning machines and taken up by two mobile loading machines. Haulage has been standardized with 18-ton semi-trailer tractor trucks.

By CHARLES LAMBUR, JR.
Assistant Editor, Coal Age

BREAKING an 18-in. seam to meet loading, hauling and marketing demands is accomplished by two mechanical pinning machines at Seneca Coal & Coke Co.'s Broken Arrow No. 4 mine, Catoosa, Okla. Each unit has a pinning speed of six licks per minute and is operated by one man. They break the entire mine output of 1,750 tons per shift, which is loaded by two underground-type mobile loading machines into 18-ton semi-trailer trucks and hauled three miles to the preparation plant.

Originally the seam was shot, and loaded by an electric shovel with a 5-cu.yd. dipper. However, more lump and reduction of impurities was wanted and in 1938 shovel loading was replaced by a Joy 11-BU mobile loading machine and hand loading into skips (*Coal Age*, p. 39, September, 1939). Shooting of the seam was discontinued and the coal was broken by running a bulldozer against steel pins placed in holes drilled in the coal. This increased lump output from 35 to 51 per cent but was an expensive procedure.

Maintenance Foreman Paul Duensing decided that a mechanical pinning method could be developed, and through company cooperation his ideas took practical form. The first machine was installed in October, 1940. Success of the principle was immediate and a second unit with several mechanical improvements was built and installed in January, 1941.

The latest unit consists of a 16½-in. square, 10-ft. vertical tower, mounted on the rear of an R-5 Caterpillar tractor. The tower is made of angle iron with 6x6-in. angles at the corners. A right-angle gear-box of 1 to 1 ratio at the power take-off of the tractor, through a direct connected shaft, drives a Foote Bros. Model 20-W 8½ to 1 ratio gear-reducer. At 600 r.p.m. it delivers 14½ hp. and through a Baldwin 140-D roller-chain on 5-ft. centers drives a lifting shaft at the top of the tower.

This shaft operates a lifting chain (another 140-D type) which extends the length of the tower 10 ft. A 16½-in. square 4,300-lb. weight with a 3½-in.-diameter 18-in.-long spike pin (machined from an old truck axle) extending from the center of one face travels in the tower frame with the pin pointed earthward. The lifting chain, by means of a lug link engaging a lug on the weight, raises this weight 10 ft. to the tower top. As the lug link passes around the chain sprocket the weight is disengaged and falls by gravity, driving the pin into the seam and breaking the coal.

A row of holes on 4-ft. centers are pinned 2 ft. from the solid coal berm and an average of four such rows, 2 ft. apart, are sufficient to permit loading of an 8-ft.-wide-cut. Occasionally the lumps are too large for loading and must be broken by pick.

Improvements in pinning-machine construction include the addition of a spring-mounted lifting shaft to eliminate severe shock as the pin is pulled from the coal. The gear reducer for driving the lifting chain replaced a differential from a 3- and later a 4-ton truck used on the original unit, as the gears of the truck differential frequently broke. The proper size weight needed to drive the pin was determined by experiment through trial and error. No mechanical delays have occurred with the new machine.

Extraction by a mobile loading machine has proved successful and another unit has replaced hand loading into skips so that all mine output now is loaded by two Joy 11-BU's. They are the standard underground equipment except that the rear conveyors have been extended 3½ ft. and "A" frames with guy ropes were added to support the conveyors. They load in different parts of the pit and the seam is broken at each location by a mechanical pinning machine.

During the experimental period of loading with Joys the haulage was accomplished by semi-trailer trucks ranging in size from 6 to 20 tons. Now, with the coal-breaking and loading phases successfully developed, the haulage equipment is being standardized with 18-ton air-operated bottom-dump semi-trailer Dart tractor trucks. The semi-trailers are made at Hume Sinclair Coal Mining Co. (an affiliate), Hume, Mo. They are specially designed with high-tensile Mayari-R steel and tapered sides, low at the rear, to permit maximum capacity with the Joy loaders. The tractors are

Left—A mechanical pinning machine breaking the 18-in. seam for a mobile loading unit. The 4,300-lb. weight has driven the 3-in.-diameter 18-in.-long pin into the coal. Note the gear reducer that drives the spring-mounted lifting shaft at the top of the tower. Right—Designed for the loading equipment, these alloy-steel 18-ton semi-trailer air-operated bottom-dump butane-fueled tractor trucks haul three miles from pit to preparation plant.

equipped with Waukesha 175-hp. butane-fueled engines and Timken differentials and axles.

There are ten Goodyear lug-type tires per unit with four 12x20-in. on the semi-trailer dual wheels, four 11.25x20-in. on the tractor-drive dual wheels and two 11.25x20-in. front tires. Three of these haulage units now are in service and this summer will be increased to six to handle the entire tonnage for the six-mile round-trip haul. In 1940, 311,173 tons of coal, mostly lump and stoker, was shipped from this mine.

ARE YOU PAYING FOR AIR

And Not Getting Your Money's Worth

Due to a Long Split, Roof Falls, or Leaks?*

By J. H. DICKERSON
Mining Engineer
Huntington, W. Va.

BECAUSE much of the mine air is short-circuited between intake and return airways at doors, stoppings, etc., the mine fan always has to set more air in motion than is actually used for ventilation. As little as 10 per cent of the air handled by the fan may be delivered to the working sections, but, in most cases, the proportion delivered could be 80 per cent or better.

When air is short-circuited from the intake to the return, it is irremediably lost, for it no longer travels where there are workings it can ventilate, and all the power used to circulate it also is wasted. If the face has sufficient air, and air leakage is reduced, the mine pressure can be lowered, for no longer is it necessary to circulate that part of the air which formerly was lost, and this useless air interferes with the passage of the air that has a useful mission to perform. Reduction of the needed fan input by a decrease in leakage will lower power requirements materially.

Waste by leakage is one of the principal reasons why ventilation power costs are high. No exact formula can be given for estimating the power loss from the total leakage, as this is affected by the location of that leakage (which will vary from mine to mine) and also by the excessive resistance, etc., in certain parts of the workings. The approximate power loss that may be expected is given by two formulas. The first has been derived from a formula presented in a paper entitled "Effects of Underground Stopping Leakage Upon Mine-Fan Performance," delivered by Raymond Mancha at the February, 1940, meeting of the American Institute of Mining and Metallurgical Engineers. It

* Third of a series of articles on ventilation. The first appeared in January, p. 44; the second in March, p. 44.

is based on the proposition that the leakage decreases proportionately as the air travels from the region of the fan to the working faces, and if the mine has a good roof and the entries are of uniform resistance it will give results approaching those found in actual practice. The difference between the results obtained by the two formulas is not large.

The second is based on the assumption that half the sum of fan input and quantity of air delivered to the last crosscuts represents the work done by the fan and that the pressure, after leakage is stopped, varies as the square of this mean quantity to the square of the quantity delivered to the last crosscuts. In reality, where conditions are uniform, the pressure for the quantity handled without leakage will be a little less than figured by this method. This second formula will allow for a decreasing rate of leakage, and for higher resistance, due to falls, etc., in the older than in the newer part of a mine. These two factors have an opposite effect on the power loss. The indicated power loss obtained by the use of this formula is a little less than for uniform leakage with uniform conditions.

In these formulas—

Q = Quantity of air at fan in cubic feet per minute taken as 100 per cent;

Q_1 = Percentage of that air at last crosscuts;

X = Percentage of power required for Q to deliver Q_1 in the same entries if leakage be stopped;

$100 - X$ = Percentage of power lost due to leakage in carrying Q_1 to face sections. Then,

$$X = \frac{Q_1^2}{Q} \quad X = \frac{Q_1^2}{100} \quad \textit{Formula No. 1}$$

$$X = \frac{Q_1^3}{\left(\frac{Q + Q_1}{2}\right)^2} \quad X = \frac{Q_1^3}{\left(\frac{100 + Q_1}{2}\right)^2} \quad \textit{Formula No. 2}$$

For an example, consider a fan delivering 100,000 cu.ft. of air per minute, with a leakage of 40 per cent between the fan and the most inby crosscuts. The actual quantity delivered to the sections is only 60,000 cu.ft. per minute, and the quantity delivered is 60 per cent of the quantity handled by the fan. Hence

$$X = \frac{60^3}{\left(\frac{100 + 60}{2}\right)^2} = \frac{216{,}000}{6{,}400} = 33.75 = \text{say } 34 \text{ per cent.}$$

If only 60,000 cu.ft. of air were delivered by the fan to the mine and none of it leaked, the mine would be as well ventilated as by 100,000 cu.ft. of air per minute with 40 per cent leakage, but, as just shown, the power required to move the small quantity would be only about 34 per cent as much.

Where only 20 per cent of the fan's air is delivered to the men at the face, it is worse than if the remaining air punched the clock but never got near the workbench, for, in traveling part of the way, it interferes with the passage of the effective air. If the stoppings near the fan are made tight and the forward stoppings still leak badly, almost as much power may be wasted as if all the stoppings leaked, for thereby some of the air will be driven further into the mine but will return with its mission not effected. It does not pay to clean up a split if it is already so effective that its current has to be choked.

The approximate power loss indicated by the use of Formula No. 2, for leakage between fan and working sections, will be as follows:

Relation of Leakage to Power Cost

Leakage Per Cent	Power Loss Per Cent	Leakage Per Cent	Power Loss Per Cent
10	19	50	78
20	37	60	87
30	52	70	93
40	66	80	97

Excessive leakage near the fan, etc., will tend to decrease the power-loss figures, but much resistance near the fan, or in the splits, or excessive leakage ahead in the newer workings, will tend to increase them; however, they are comparatively close for most conditions.

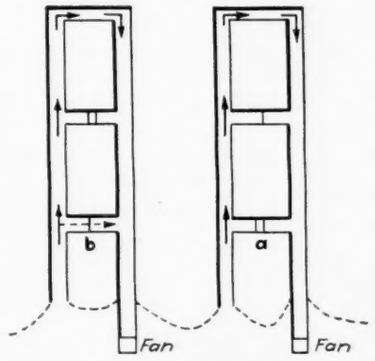


Fig. 1—The simplified mine on the right demands more work from the fan because the leakage, supposedly just as bad, occurs farther within the mine at *a* instead of at the first crosscut, *b*, as in the mine on the left. So the full air current has to be driven further into the mine.

In the foregoing example, if the leakage were stopped, and it were desired to have the full 100,000 cu.ft. per minute delivered to the face sections, the approximate power required would be as Y in the equation $100^3 : 60^3 :: Y : 34$. Y equals 157 + per cent, so the power required would be about 57 per cent more than for 100,000 cu.ft. per minute with 40 per cent leakage. If a delivery of 100,000 cu.ft. of air per minute to the face section without reducing the leakage were desired, at least 66⅔ per cent more air would be required from the fan, as the increased quantity is still subject to the 40 per cent leakage. In this case we are not changing the mine conditions, and the pressure will vary as the square of the quantities, and the power as the cube of the quantities. If the pressure is 2-in. water gage for the 100,000 c.f.m. with 40 per cent leakage, the pressure for the increased quantity would be as X in the proportion: $166{,}666^2 : 100{,}000^2 :: X : 2$ or $5^2 : 3^2 :: X : 2$, so the pressure would be increased from 2 to 5.55 in. water gage.

The power will be as Y in the equation $166{,}666^3 : 100{,}000^3 :: Y : 100$ or $5^3 : 3^3 :: Y : 100$. As Y is about 463 per cent, the power required would be 4.63 times as much as for 100,000 cu.ft. per minute with 40,000 cu.ft. per minute leakage, compared with 1.57 times if the same entries were used and the leakage were stopped. This may be checked by multiplying 4.63 by 34 per cent as used in the foregoing paragraph.

In practice, the increased pressure is likely to enlarge the old leaks or open new leaks, so that more air would be required, and power loss due to leakage would be higher. These calculations are based on the actual work to be performed, and do not take into consideration the varying efficiency of a fan or its adjustments.

Because of the higher pressure, stoppings near the fan usually are constructed so as to be more resistant to leakage than others, and this may cause more leakage further ahead, which would make the power consumption greater, if as much is lost ahead as would be lost otherwise nearer the fan. If all the stoppings are of equally good construction, the air loss per stopping near the fan will be greater, and this may be true even with a better type stopping near the

fan, for the first stoppings erected will have suffered from age and, moreover, roof pressure, etc., may have caused bad leaks which have never been discovered and repaired. It usually is not practically possible to compel all the air to travel from the fan to a distant point unless the entries carry air in one direction only, but if the leakage is kept under 10 per cent, which can be done, the power loss due to leakage will hardly exceed 19 per cent.

If a monthly report of the air near the face shows that leakage is increasing seriously, it should be located and corrected. Slate should not be piled against stoppings, because it is then difficult to inspect and repair them, and the pressure of the slate itself may cause leaks. In building masonry stoppings, see that the coal is solid and recess the masonry into the ribs; sometimes this is desirable also in top and bottom.

Leakage may be decreased by plastering for a short distance the face of the masonry and also the adjoining ribs. Leakage between airways is almost entirely through doors and stoppings, but, when the thickness of the chain pillar is less than 20 ft., it may become creviced, due to blasting or insufficient barrier pillars, so there may be leakage between the stoppings.

In some sections it is the practice to drive entries on 33-ft. centers, with rooms from both headings, but the ventilation is likely to be poor, and sometimes squeezes and other difficulties occur. Where there are but two entries it seems desirable that chain pillars have a minimum thickness of 40 ft.

Power required for mine ventilation is increased by falls, timbering, rough ribs, crooked headings, gob on sides, trips of large cars in narrow airways, high velocities, etc. If the mine is ventilated by several natural splits, the one most in need of better air should receive first attention, after the main entries have been improved. Haulage headings must be regarded as airways unless separate entries are provided to handle the air in both directions.

As long as a regulator is used in a split, resistance in that split need not be reduced, but special attention should be given to that split which, because of its high resistance, has not had to be regulated, for this split helps to determine the mine pressure that the fan must provide. As two equal headings will carry as much air as one with only one-fourth the power, and three with one-ninth the power, the mains should have sufficient airways, both for intake and return air.

Cutoffs sometimes may be provided to shorten the main airways and save power. Main entries should be driven straight and without unnecessary crosscuts, and their sides should be as smooth as practicable. Rock usually will occupy more space after it has fallen than before, and it frequently will pay to level it off, or haul part of it out, so as to reduce the resistance and the velocity.

It may pay to brush the roof at the end of a fall, rather than to move the entire mass (see Fig. 2). In this way, shock losses caused by abrupt vertical turns or reduced area will be eliminated. Rectangular horizontal turns in main airways also should be avoided. The resistance of such a turn will equal that of about 250 ft. of clear heading.

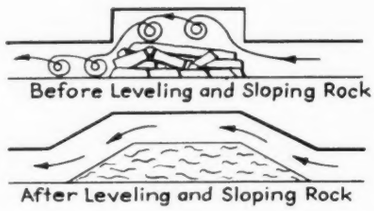


Fig. 2—Leveling and taking off the vertical elbow turns reduces the whirling of the air which is the source of so much resistance and fan effort.

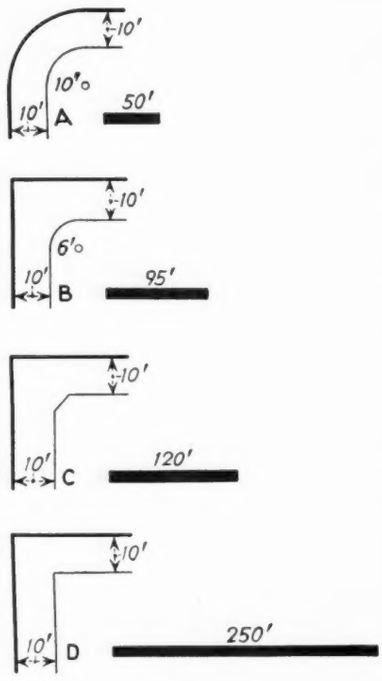


Fig. 3—Turns increase resistance. The curve in *A* causes as much resistance as 50 ft. of heading and that in *D* as much as 250 ft., which is almost as far as the distance between adjacent crossheadings.

Uniform curves should be provided in airways as well as in haulways, and, the longer the radius, the lower the resistance, and the nearer the latter will approach that of a straight heading. If it is not practicable to drive a curved airway in place of a right-angle turn, the inner corner should be cut or rounded. In the turns illustrated in Fig. 3, the resistance for *A* will be less than for a 50-ft. length of straight heading; *B* about that for a 95-ft.; *C* about that for a 120-ft.; and *D* about that for a 250-ft. length.

Moreover, there are often surface cracks through which air escapes or is drawn into the fan, causing a loss of power. There are similar losses in air shafts. In shafts where only a curtain wall separates intake and return air, leakage frequently reaches 20 per cent, and has been found as high as 50 per cent. It generally is impractical to maintain an airtight curtain wall, and avoid considerable recirculation, hence reliance on such a wall is extremely undesirable, even where it is permitted by law.

Booster fans often are installed where the condition of the air has become intolerable, due to an inadequate mine fan, leaks in the air circuits, falls, water, etc., reducing the air supply. Where they are used, and the mine does not develop flammable gas, they may be placed on the return airways, but tight stoppings between those airways and the intake airway must be provided back to the main headings.

Recirculation may be practically eliminated in this way, and the proportion of air passing through the booster which has reached the face section will depend on the leakage between these points, just as it would with a similar volume and pressure due to an outside fan. Where a booster is near a shaft bottom, it may handle fresh air, or it may be arranged that the motor will run in fresh air even though the fan handles the return.

Booster fans have been used to save power, by reducing the pressure against the outside fan, where there is a long split of high resistance such as affects the mine pressure, but the use of boosters for this purpose is not common, for boosters rarely can be installed in gassy mines, and in low coal efficient fans that would supply all the air needed in a split have been rather too large and expensive for this purpose, but the new streamlined propeller fans and improved centrifugal fans are of such reasonable size and price that they can be used satisfactorily for this type of duty.

LOADER OUTPUT LIFTED

By Big Cars and Transfer Hopper In Coal 6 to 6½ Ft. Thick at Kings Mine

Where mobile transportation equipment, such as mine cars, is used behind loading machines, car capacity is directly reflected in loader performance. The bigger the car the higher the loading-machine output. Non-loading time is further reduced by keeping changing points close to the face and using two or more changing units to shorten the interval between taking out a loaded car and placing an empty. Adoption of these principles at the Kings mine has proved that theoretical benefits can be obtained under actual operating conditions.

By IVAN A. GIVEN
Associate Editor, Coal Age

WITH an existing shaft limiting size of car hoisted, other means of increasing capacity of equipment serving the loading machine must be sought. At Kings mine of the Princeton Mining Co., Princeton, Ind., the decision went to 10-ton drop-bottom transfer cars handled by standard cable-reel locomotives. These cars operate between the face and a transfer station where the coal is dumped and reloaded into regular mine cars for hoisting. The first big-car installation, serving at the peak four production loaders and one development and clean-up machine, has increased average loader output 20 per cent or more, compared with loading directly into the original 3½-ton mine cars. Plans call for additional equipment to permit keeping two stations operating while a third is being moved to a new location.

The big cars, operating on the regular mine tracks, can be used with either track- or caterpillar-mounted loaders, both employed at Kings. Since track always is available, special equipment for moving cutting machines, drills, supplies, etc., is not required. Locomotive service also is considered more desirable with the heavy local grades encountered, which run up to 15 per cent or more.

The panel system (a block of rooms is entirely surrounded by pillars) is used at Kings mine. Panels are worked in two stages for maximum recovery of coal. This also permits sealing the inby half if desired without affecting the outby half. Places mostly are turned on a 45-deg. angle. Coal is broken with air on the shift. This permits a continuous working cycle, reducing number of working places for a territory. Air also increases coarse-coal yield, in addition to making firmer lump.

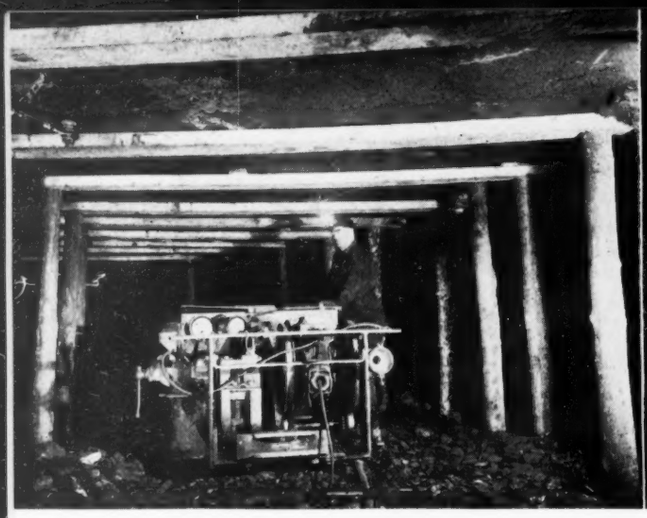
The Indiana 5th Vein is mined, ranging from 5 to 7½ ft. in thickness and averaging about 6 to 6½ ft. General dip is about 2 per cent southwest. Cover now is around 530 ft. Underneath the coal is a hard fireclay, which makes a good bottom when dry. When wet by seepage, however, the fireclay disintegrates, which has forced abandonment of some panels.

Over the coal is a light-gray slate, which normally stays up fairly well as long as work continues. When operations stop for any length of time, however, the slate falls indefinitely in slabs an inch or so thick. To take care of this situation, the mine management, which includes D. W. Jones, superintendent; Placide Mayeur, day foreman; and George Guiney, night foreman, is experimenting with white-oak-plank headers 2 to 3 in. thick and 12 in. wide in such openings as room headings, as experience indicates that if the first layer of slate can be held, no further slabbing will occur.

Planks cost no more and sometimes less than heavy wood or rail bars, are easier to put up, have a large bearing surface so that it is difficult to twist them out and, it is expected, will hold a substantial weight without breaking, even though they bend more, for example, than the conventional wood crossbar. Plank headers are spaced 5 ft. apart, with the legs set on lines established by the engineers, headed by R. C. Everson, Terre Haute. At room necks, crosscuts, etc., one end of the headers is supported on collar bars.

Active rooms also are subject to slabbing, usually to a lesser extent. In any case, two rows of posts are set on both sides of the track. Posts next to the track are capped by tapered wedges made by cutting a regular room tie diagonally in two. The feathered end is placed over the roadway and provides more clearance along with support at this point.

New working territories are tapped by main entries made up of three pairs of headings. Six-heading mains, instead of four, were adopted in 1937 to increase chain-pillar length and cut the number of stoppings. More airway area was another factor, and the extra openings provided additional space for tracks in the big-car set-ups. Heading width is 13 ft. Pairs are



Plank headers used to hold slate in long-lived openings.

Undercutting a room face in Kings mine with a shortwall.

driven on 32-ft. centers. Pillars 29 ft. thick cut through at 185-ft. intervals are left between pairs.

Panel entries are turned off both sides of a main as shown in Fig. 3. Main lines usually are driven and panel entries started by Goodman 260-A track-mounted loading machines accompanied by Jeffrey 29-LE or Sullivan CLU track-mounted cutting and shearing machines and portable Airdox units. With six headings, plus crosscuts and panel entries, and working (air coal-breaking) on a continuous cycle, such machines have ample opportunity to load good tonnages and leave the bottom in good shape for subsequent main-line track. Record production has been 370 tons (106 cars) with small cars and 460 tons (46 cars) with big cars with sideboards in seven hours, using crews of 12 or 13 men. Normally, production with small cars is around 300 tons (90 cars) per shift; big equipment, 38 to 40 cars per shift.

Other than the main-entry units, no strictly development machines are operated, although one Joy 8BU machine with a small crew (usually four men) is used for starting room necks, cleaning up and other similar work. Two panel headings are turned off the main to limit the number of openings to be sealed, after which an extra place is driven for more coal until the inby subpanel is reached, whereupon a return is made to two heads, again to cut the number of seals.

The two subpanels in a complete panel are each approximately 700 ft. wide and 400 ft. deep. In developing, the practice is to turn branch entries right and left at the entrance to the outby subpanel. Originally, these branches were turned on a 45-deg. angle and driven up to the limit, including starting a few rooms for coal when required. These places then were allowed to stand until the inby subpanel was finished. However, roof deterioration and other difficulties resulted in frequent inability to drive out the long rooms. Also, unless track was left, at least 23 switches were required to start this subpanel. Consequently, the plan shown in Fig. 1 has been adopted.

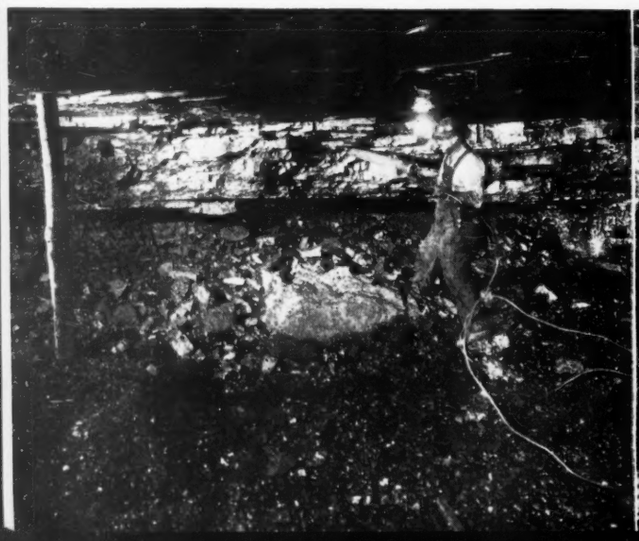
Entries Angled Twice

Under this plan, branch entries serving the outby subpanel are angled twice to put them at 90 deg. to the panel entry, and usually are driven completely up during the development stage. Two headings on each branch are cut 26 ft. wide for both coal and plenty of airway area and the top is allowed to slab. The other is driven 16 ft. wide, and is timbered with the plank headers to keep it in condition until the inby subpanel is worked out. Then by laying twelve switches it is possible to open up the new subpanel territory. Room length is kept down by increasing number of branch headings to three.

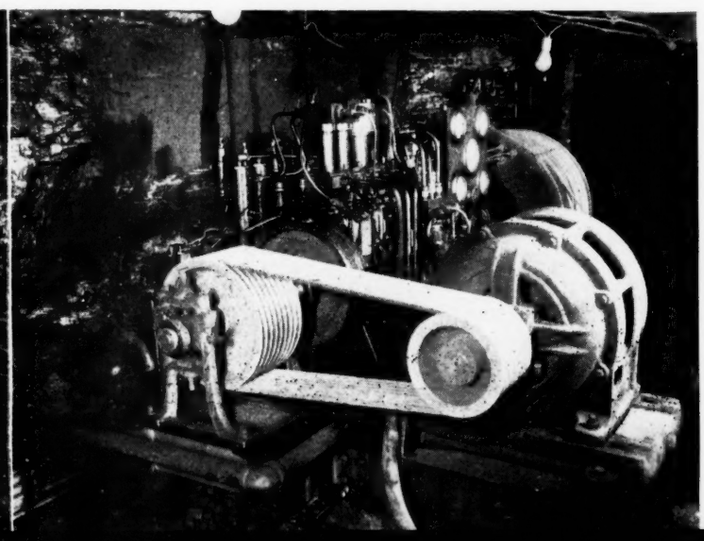
In developing inby subpanels, however, the original 45-deg. branch entries (Figs. 1 and 3) have been retained, as this section is worked continuously, reducing roof deterioration and other troubles which might prevent completion. When the loading machine advances into the section it fans out. When sufficient places are available, a second machine may come in and take one side, with the original machine the other. Or the original machine may finish the subpanel, sometimes working first one and then the other side. Then work is started in the outby section while the inby one is sealed if desirable. The 45-deg. branch entries in the inby subpanel automatically shorten the length of the working places, reducing room trackage and picking-up with attendant switchlaying.

Rooms are driven on 44-ft. centers, which enables the caterpillar-mounted machines to load out crosscuts, work-

Face after the lower holes have been broken. The "shooter" is placing new-type air-breaking tube in top hole.



One of the three stationary compressors used in breaking coal with air at the Kings mine, near Princeton, Ind.



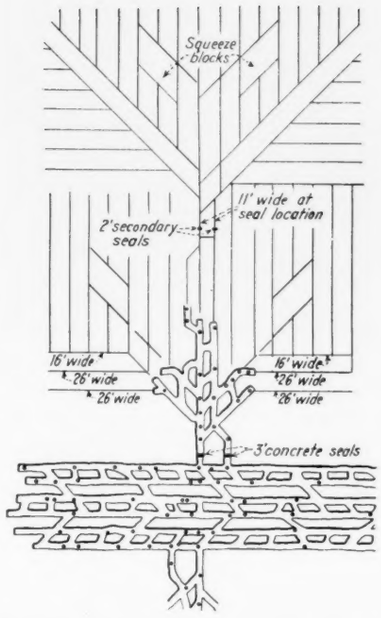


Fig. 1—Latest panel-development plan at Kings mine, showing new system of opening up outby subpanels.

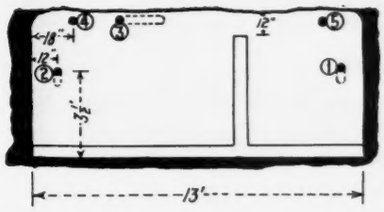
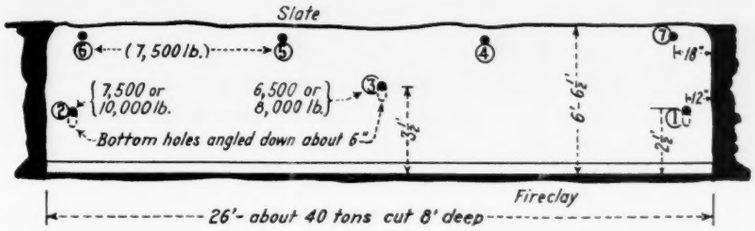


Fig. 2—Drilling plans for 26-ft. rooms and sheared headings, Kings mine.



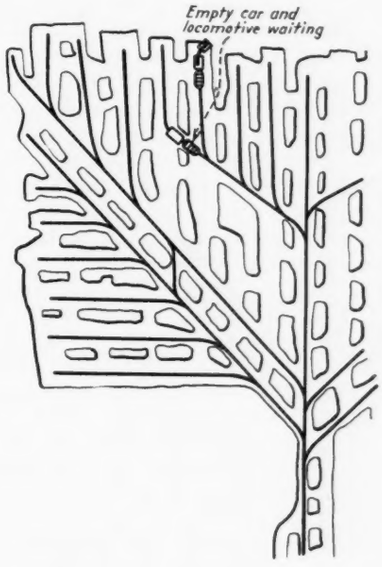


Fig. 4—Typical pick-up plan at Kings mine, showing changing system with big cars.

Fig. 3—Late workings in Kings mine, showing panel-working methods and big-car set-ups in mains already developed, as well as the new set-up for future territories.

Loading machine filling a big car with coal in a room in Kings mine.

A big-car unit consists of a locomotive and a 10-ton drop-bottom car.

ing from two sides, without laying switches or turning the track. Rooms are necked 14 to 16 ft. wide for two cuts and then are widened to 26 ft. Room length varies. Width is increased to 30 ft. toward the end, meaning the last 50 to 100 ft. in the longest, depending upon top conditions and speed of advance. By thus increasing extraction, recovery within a panel, in spite of the heavy cover, normally is around 65 per cent. Squeeze blocks (Fig. 1) are left in present and future panels to insure complete extraction.

First Station in 1939

The first transfer station, with one big car, was installed in March, 1939. The second station, with the type of equipment finally selected, went in in January, 1940. The first big car (February, 1939) was equipped with three drop doors. To decrease height over the transfer conveyors and thus reduce brushing in installing a station, six-door cars were purchased starting in April, 1939. By June, 1940, a total of 16 big cars, or enough for five loading machines (three cars each), with one spare, were in service.

The first transfer installation (Fig. 3) was made in a main entry, since it already had been developed. In this set-up, it was necessary to bring loads in from both sides of the dump, resulting in some complications in both dumping and scheduling of small-car handling. A similar set-up is planned for another main already developed (Fig. 3), but one-way dumping and separation of big- and little-car operation will be the rule.

With these installations completed, the management will go to the set-up shown at the west in Fig. 3. In this set-up, big cars will come in from both sides as well as off the main, those from the south using the runaround west of the transfer station. Y's at the mouths of the panels to the south will turn the cars so that the proper ends will be presented to the loading machines. Big- and little-car operation will be completely separated.

Over 350,000 tons has been handled by the original installation, with perhaps 50,000 more by the time it is moved. Production from succeeding locations is expected to be 500,000 tons or more each. Normal output with the first set-up was 1,800 to 1,850 tons (around 500 little cars at 3.7 tons each) per shift, using five loading machines. Of this total, about 175 tons was produced by the 8BU unit in development and clean-up, with the rest from one Goodman 260-A and three Joys (7BU, 10BU and 11BU). Six machines loading into small cars (holding 3.5 tons loaded directly) in other sections were accounting for around 1,700 tons. These machines were one 260-A, three 5BU's, a 10BU and an 11BU.

Day's Record 504 Cars

The record day for the transfer station was 504 3.7-ton cars. On this day, the 8BU, served by one big car (2,000-ft. one-way haul), was credited with 51 little cars. The other equipment was served by three big cars each. From two machines, the haul was 1,200 ft.; from another, 2,000 ft.; and from the fourth, 2,500 ft. The record for one loading machine is held by the 11BU, which produced 77 big cars (9 to 9½ tons per car without sideboards) on the night shift Dec. 8, 1940.

The transfer station employs standard Jeffrey 61-EF chain-and-flight conveyors. Two conveyors side by side and fitted with removable sideboards make a hopper about 40 in. deep (to the bottoms of the pans) and 42 ft. long, holding something over 20 tons. Longest doors on the cars are 28 in., which clear the flights 12 in. or more. The hopper conveyors discharge into two 42-ft.-long cross conveyors on a 9½-deg. pitch extending through a crosscut to the car-loading station, where all the controls are located. The cross conveyors are set just far enough apart to fill completely one small car without moving. Trips of small cars are pulled along by an 8-ton locomotive. A signal light and cords hanging from the roof at car-length intervals facilitate spotting.

A full crew for transfer-station operation comprises four men: dumper, who also cleans up, oil and greases; an operator; and two motormen. Trips to and from the bottom are followed by a safety locomotive, which spots empty trips on the proper tracks when the main-haulage locomotive cuts off to pick up the loads.

Conveyors Set on Bottom

In installing a transfer station, the hopper conveyors are set on the bottom. Height over the tracks, which are inclined up to the hopper, is obtained by shooting the top. Briefly, the operation comprises shooting; loading out the rock with a loading machine where the conveyors are to be set; leveling down and feathering off the rest of the rock, throwing excess into crosscuts; and then installing the conveyors and track. Over the hopper, the track is supported on rails the ends of which are placed in holes in the ribs with the projecting sections resting on timber sets braced and tied together to prevent movement either endwise or sidewise. Sideboards on the conveyors are leaned against the timber sets. The final operation is shooting out a hole in the adjacent entry for the discharge ends of the cross conveyors.

Man-shifts of labor to make the initial installation, including taking in the equipment, were approximately as follows: drilling, 10; shooting and loading out rock, setting up, and installing the track over the hopper, 50. Labor for succeeding installations is expected to be the same or less, including tearing up and moving.

With the exceptions naturally en-

countered, the standard loading unit at Kings mine, using small cars, comprises a loading machine, cutting machine (Goodman 112-AA's with 8½-ft. bars, in addition to the 29-LE 8½-ft. bar) and CLU's (10½-ft. bars), previously noted; Chicago Pneumatic post-mounted drills with Hardsocg augers and Hardsocg and Coalmaster heads and bits, and two locomotives (6- or 8-ton Goodman, General Electric or Jeffrey), plus a relay locomotive part time. Crews normally aggregate 14 men, including two motormen, two tripriders and "shooting" labor. Kings at present uses three stationary and five portable compressors for Airdox coal-breaking.

Three Cars per Loader

With the big cars, a maximum of three (when hauls are longest), each with its 6- or 8-ton locomotive, is assigned to a loading unit. Crews are made up of three motormen, loading-machine operator and helper, two cutters, one or two tracklayers, one or two timbermen (depending upon whether one or two trackmen are working), two drillers, one "shooter," and one boss. As stated, such crews average 400 to 425 tons per shift.

The transfer cars have a water-level capacity of 253 cu.ft. With sideboards for use behind track loaders they hold up to 11 tons. Without sideboards, usual loading is 9 to 9½ tons. Sanford-Day cars with six sequence-dropping doors, 16-in. "Floater" wheels with Fafnir ball bearings, and three-link couplings are used. Length over the bumpers is 16 ft. 4¾ in.; length of body, 15 ft.; width, 7½ ft.; height over rail without sideboards, 40 in. Wheelbase is 58 in., and the cars can easily take a No. 2½ turnout. A safety catch prevents accidental unlocking of doors in transit.

The big cars have raised loading time to about 64 per cent of the total shift, compared with the already high figure of approximately 51½ per cent with the 3½-ton equipment. They also simplify movement of production equipment, since storage of cars in working sections is eliminated and there is no interference between empty and loaded trips. Haulage speed is lower because sufficient units are available so that one has plenty of time to get back before another is loaded. Coupling and uncoupling are eliminated and, with the big car, the operator does not need to watch his rear conveyor as closely.

Cutting follows loading at Kings, the cutters setting their own safety posts. Standard bits are tipped with "Sulite" in a Sullivan plant, and cut about 5 tons before resharpening and retipping, compared with about 1 ton with untipped bits. Headings, where track-mounted loading machines are used, are sheared over one rail to within about 1 ft. of the top, where sulphur makes cutting extremely hard. This has been found just as satisfactory as a complete cut to the top.

Seven Holes Drilled

Drilling is next. Seven holes are drilled in a 26-ft. place. Bottom holes are angled slightly downward. Bottom rib holes are broken first, as starting with the center hole would bring down the entire lower part of the cut, rendering the rib holes useless. Fig. 2 shows hole placement, breaking sequences and air pressures normally used. The higher pressures are for portable Airdox compressors, where the air already is heated and expanded. Main lines from stationary units are steel pipe and sufficient is left in place to act as a reservoir and thus eliminate receiving tanks where several "shooters" are operating at one time. A new Airdox tube at Kings provides both quicker charging and release cycles and is equipped with a rounded collar at the rear end to reduce breakage of the pigtails to which the copper tubing is connected.

In 30-ft. rooms, the plan is the same except that five holes are drilled in the top. Five holes (Fig. 2) also are drilled in sheared headings. Hole diameter is 4¼ in. Tubes are 3⅝ in. in diameter and 60 in. long.

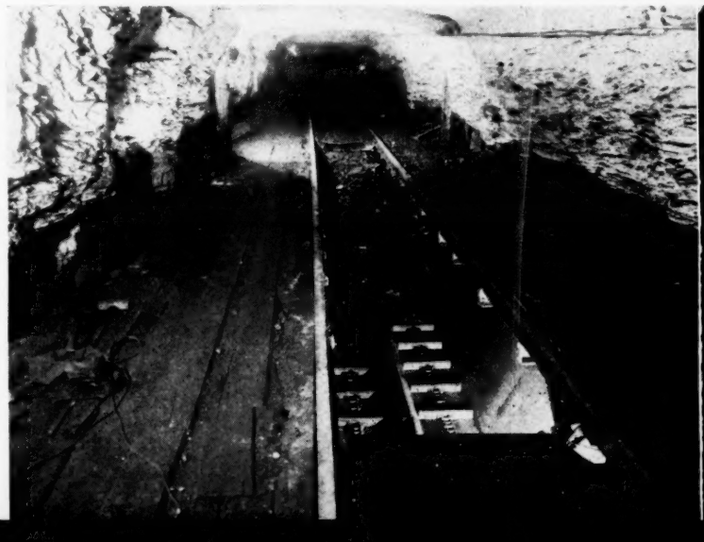
After the face is broken down, track and timber are extended. Panel entries and rooms are laid with West Virginia steel ties and steel-tie turnouts, using 30- and 35-lb. rail. Finally, the place is inspected just before the loading machine enters. Track up to the panel entries is laid with 70-lb. steel, using Bethlehem or West Virginia steel ties and Thermit welding. Further stability is provided by inserting wood ties in swags, which evens up grades.

Switching Time Cut

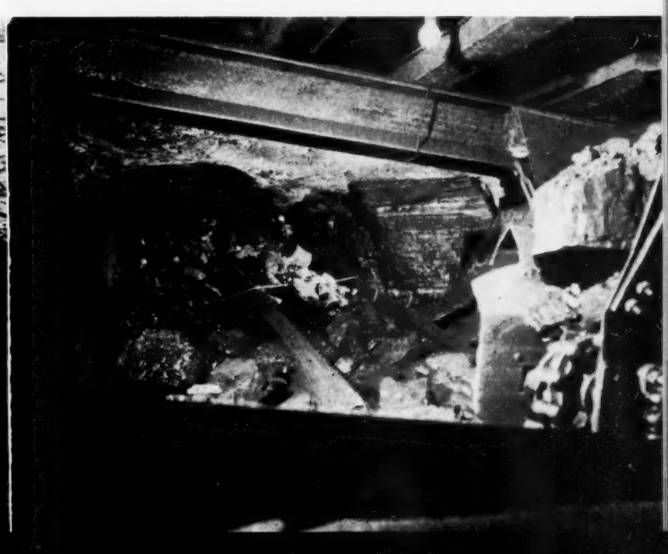
Because two or three big cars are used behind one loading machine, one always is able to get back to the changing point (Fig. 4) before the car at the machine is finished. When it pulls out, the waiting unit moves down through the switch (spring throw) and heads in to the machine. This materially reduces switching time. No tripriders are employed, but where time is available, as it frequently is, the waiting motorman may act as a triprider. Occasionally, when conditions make it possible, two or three big cars may be made up into a trip and the conventional changing system employed.

Because the new big cars are larger, rear conveyors on loaders have been lengthened some 40 in. by welding in new sections. Load is added to the head to counterbalance the extra weight. To get the motorman away from the end of the rear conveyor, gathering locomotives have been reversed (p. 69).

Transfer station, showing the two hopper conveyors. Height for the track was obtained by shooting the top.



Showing the two inclined cross conveyors which carry coal from the hopper conveyors to the loading point.



LARGE SCOOTERS

Serving Loading Machines in Thin Coal

Discharge to Conveyors at Bergoo No. 2 Mine

Broadening the field of transportation behind loading machines, scooters now are used at the Bergoo No. 2 mine. Such units, made up of self-discharging boxes pulled back and forth from face to loading station by hoists, make possible an output of 13 tons per man-shift with machine loading in thin coal. In hand-loading service, under conditions far from ideal, the output is 10 tons per man-shift.

By J. H. EDWARDS

Associate Editor, Coal Age

THREE new steps—machine loading, larger units and dumping to gathering conveyors—mark advances in scooter mining at the Bergoo No. 2 mine, Pardee & Curtin Lumber Co., Bergoo, Webster County, West Virginia. In 27- to 46-in. coal, under conditions far from ideal, the performance in sections worked by hand loading into scooters is 10 tons per man-shift. In sections where scooters are loaded by machine, the average is 13 tons per man-shift. These figures are based on delivery of the coal to the main sidetrack and are long-term averages, including the moves which have been necessary and much experimental work.

Sixteen scooters are in use. Eight of them are hand loaded and the other eight are loaded by two Joy 12BU machines. The scooter design—unique in several features—was developed by the coal company's engineers as a continuance of the work done by Gilbert Smith (*Coal Age*, February, 1939, p. 55; May, 1940, p. 29; September, 1940, p. 47).

Details of the Bergoo No. 2 scooter development were supervised largely by the late A. Fred Phelps, mine superintendent. Bergoo No. 2 is one of three Pardee & Curtin operations all in the Webster Springs field. During 1940, these mines shipped 887,000 tons from the Sewell seam. F. K. Day is general superintendent, E. F. Curtin is general manager, and G. D. Curtin is president. Mines are on the Western Maryland R.R. and practically all the coal goes to Eastern markets, with a large part to byproduct ovens.

Exhaustion of territory with 48 in. or more of coal, plus the urge for lower mining costs, prompted the introduction of mechanical equipment at Bergoo No. 2. The seam outcrops 900 ft. above stream level and is free of gas. It has a general pitch of 1 per cent and contains numerous local dips with grades up to 25 per cent. Average thickness of the coal now being mined is 36 in. and it is free of partings. The top is a frail to medium-strength sandy gray slate and the bottom a hard sandstone. Always, in grading or making height on haulways, top rather than bottom is taken. The irregular mining area bounded by outcrop ranges from 2,000 ft. to one mile in width.

Coal is lowered in monitors to a 5-track tipple equipped with main shaker, crushers, and vibrators. Seven sizes, all sprayed with oil when desired, can be loaded. Tipple and mine, including the hand-loading and scooter sections, operate two complete

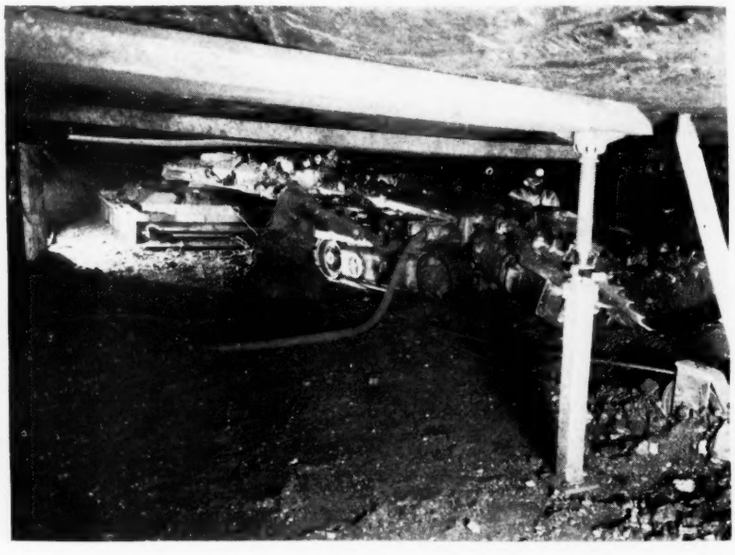


Fig. 1—Machine loading 2½ tons of coal into 6½x12-ft. scooter in 46-in. coal. At the extreme right are the tail-rope sheave and jack.

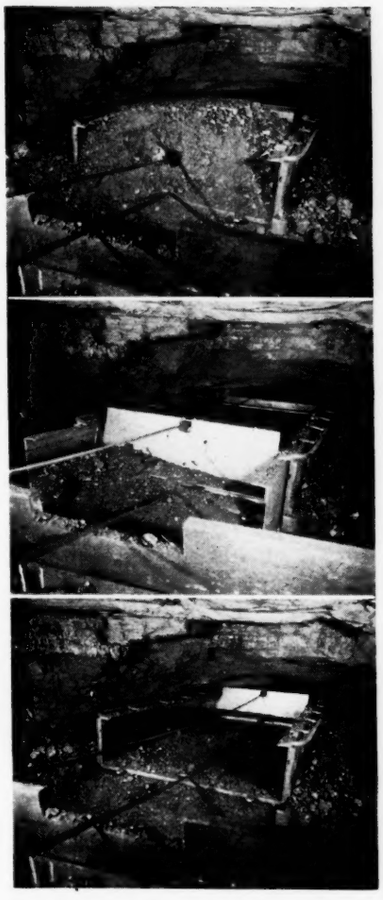


Fig. 2—Top, full scooter at the dumping point; center, endgate has practically completed its forward travel. The endgate guide channels extend beyond the box and ramp; bottom, endgate returned to normal position after dumping.

shifts per day, one starting at 7 a.m. and the other at 7 p.m. Of the 24-hour production, 1,300 tons is hand loaded into mine cars and 1,000 tons handled by scooters. Production by this mine last year was 492,000 tons.

Chain conveyors, three of which regularly have a part in the scooter system, were introduced in 1934—principally for development. These and an experimental loader installed at the same time marked the first departure from a strictly hand-loading operation. Six of the conveyors were in use in development when the scooter experiments were started in the summer of 1939 and the same number still continue in that phase of mining. Three conveyors gathering scooter coal and another in a panel heading discharging to one of the scooter gathering conveyors are additional units.

Fig. 4 shows a loading-machine and scooter set-up except that the scooter boxes and ropes for Rooms 1, 2 and 3 are omitted to simplify the drawing. To work the four rooms the loader is trammed through crosscuts on 45-ft. centers. Thus, only one scooter is in use at one time and the scooter hoist operator moves from one hoist to the other to serve the Joy crew. Scooters dump directly into a gathering conveyor along the rib on the haulway parallel to the track. This conveyor may at the same time be serving another chain conveyor used in extending the triple-heading entry. After the rooms on one side of the panel have been worked, the hoists and ramps are moved to opposite positions to work rooms on the other side.

A scooter box with a capacity of 2½ tons is the largest used with Joy loaders. Its dimensions are 6½ x 12 ft. x 12 in. deep. In unloading it into the conveyor, the head rope pulls the rear endgate forward after it has been unlatched automatically by two inclined lifting brackets attached to the sides of the ramp. The endgate is made with rigid channel side pieces 18 in. long which slide in the channel sides of the box, thereby preventing binding of the endgate.

The endgate latch arrangement, hit upon after considerable study and experimentation, is shown in Fig. 3. The round-rod keeper extends across the box and engages a latch at each side. It works in vertical slots in the sides of the box and gravity keeps it in the locking position. Collars and cotterpins hold the rod from moving endwise. As the scooter box nears the end of its travel on the ramp the rod rides up on the inclined brackets. Soon after release of the endgate the box advance is stopped by hooks at the end of the ramp, as shown in Fig. 2.

Head-rope hauling speed is 370 f.p.m.; tail rope, 425 f.p.m. Rope sizes are ⅝ and ½ in., respectively, and both are 6x19 plow steel grade, Lang lay, preformed. The tail rope runs through the coal in the box and through a hole in the endgate, where three rollers protect it from rubbing the endgate structure. At the front end of the box the head rope is kept at approximate center by a stirrup welded to the bottom.

Hitching of the head rope to the endgate must be short so that during discharge the endgate can move close to the front end of the box before the rope fastening hits the stirrup. The newest hitching consists of two ¾-in. pipes 10 in. long welded side by side into the endgate structure. They are parallel to the length of the box and are positioned at the center of the endgate near its lower edge. To make the attachment the head rope is put through one pipe with its end sticking out back 2 in. The tail rope is brought through the other pipe from the opposite direction and its 2-in. protruding end at the front is then clamped to the head rope. A second clamp applied to the two ropes at the other end of the pipes completes the job.

In sections where scooters are machine loaded, rooms are driven 35 ft. wide on 55-ft. centers and 250 ft. deep. Seam thickness must be 39 in. or more

(*Turn to page* 56)

Fig. 3—Left, the sliding endgate to which both ropes are attached is latched by a round bar which drops in ahead of a hook on the endgate structure; center, and right, hooks on each side of the discharge ramp limit scooter travel and enable the endgate to push out the coal.

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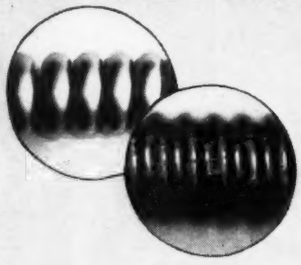
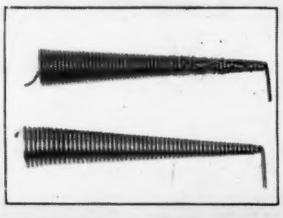


HEAT SHOCK

The top sample (below) shows what happens to good enameled wire when it is wound in a helix and heated to 150 C. Formex wire (shown at bottom) is unaffected by this heat shock. That is why it does not become brittle and crack away even after years of strenuous service.



ELONGATION

Compare the two pictures above. The top photo shows Formex wire stretched 20 per cent and wound on its own diameter. The lower picture shows enameled wire stretched 10 per cent and wound on twice its diameter.

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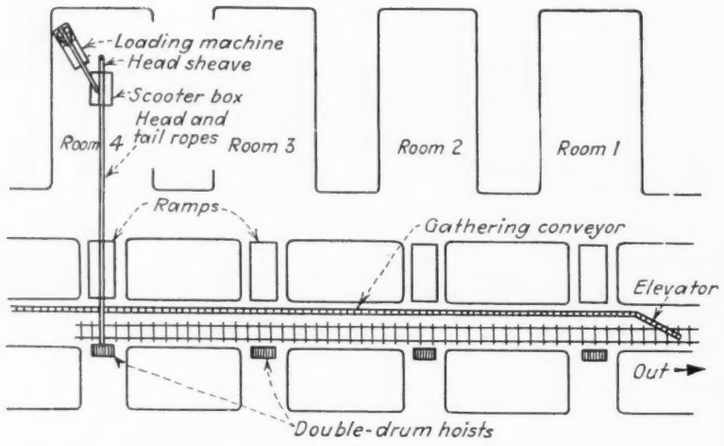


Fig. 4—Layout for serving one loading machine with four scooters discharging into gathering conveyor.

for this work. After the four rooms have been advanced the full depth with the loader, the pillars are mined back open-ended by hand loading into a face conveyor delivering to the scooter. Roof weight breaks down the pillar coal and thus no shooting is necessary in retreat work.

Where the seam thickness is over 36 in., room width, room centers, and the pillar recovery method in a four-scooter hand-loading set-up are the same as for machine-loaded scooters. In this hand-loading scooter work (over 36 in. of coal), the scooter box is positioned with its side 6 ft. from the rib and a 26-ft. face conveyor delivers to it. Timbering for securing a break after each cut during pillar recovery consists of four rows 2 ft. apart. Three rows are recovered and moved up each cut. The face is protected by 2x10-in. wood crossbars supported with Simplex screw jacks. Liberal use is made of the same type of jacks in room advance work, especially in loading-machine rooms.

Where the seam thickness is under 36 in. and hand-loaded scooters are used (lower limit, 27 in.), rooms are driven 22 ft. wide on 32-ft. centers. All loading in this thinner coal is directly into the scooter box. None of the 10-ft. pillar is taken.

To recapitulate, the 16 scooters in service are combined into four units used as follows: (1) four scooters with four face crews loading into the scooters or associated face conveyors, the scooters dumping into a gathering conveyor; (2) four scooters in 36- to 27-in. coal hand-loaded by four face crews, the scooters dumping into a gathering conveyor; (3) four scooters dumping into a gathering conveyor and taking coal from a loading machine alternating between the four room faces in coal over 39 in. thick; and (4) four scooters taking coal from a loading machine as in Set-up No. 3, except that the scooters dump directly into mine cars.

In the fourth unit, scooters are 5½ x 11 instead of 6½ x 12 ft., principally because the smaller size carries a load which exactly fills one mine car. Experiments with the two sizes of boxes have indicated that the smaller tracks straighter and that for best tracking, apparently, box length should be twice the width. Boxes have curved-end fender rods out to the sides beyond the top edges.

A Jeffrey 35B undercutting shortwall with 8-ft. bar is installed in each of the eight hand-loading scooter rooms. Cutting in the four rooms for each machine-loading scooter unit is handled by a new Sullivan 9B 20-hp. top cutter which cuts just under a thin stratum of cannel or bone which appears only in the loading-machine section and is not loaded out. These 9B cutters (two in number) are transported by Joy T2-3E low-pan caterpillar trucks.

Marathon bit holders and double-ended throwaway bits are used in the standard cutter chains and have effected a saving in transportation to and from the mine warehouse and the working places. Widely separated hand-loading and scooter sections make that an important factor. To get new Marathon bits the cutting-machine operator must turn in an equivalent number of dulled bits or do some exact explaining to the general mine foremen.

In a four-room machine-loading scooter section the loading crew consists of an operator and a face man. Three or four men, depending on the amount of deadwork, make up the face-preparation crew for the four rooms. One hoistman operates the four scooters and one man, termed a "head man," is stationed at the gathering-conveyor discharge. In a four-room set-up with hand loading directly into a scooter or into an associated face conveyor there are three men at the face in each room. Two hoistmen work on the entry, each operating two scooters alternately.

Scooter boxes in rooms where the coal is hand loaded are 4 x 8 ft. and 12 in. deep. Each is pulled by a Sullivan B213 10-hp. double-drum electric hoist. In the loading-machine scooter set-ups, using eight of the larger scooter boxes, the hoists are of the same type but with 20-hp. (30-minute rating) motors. Auxiliary equipment for room scooter mining includes ten

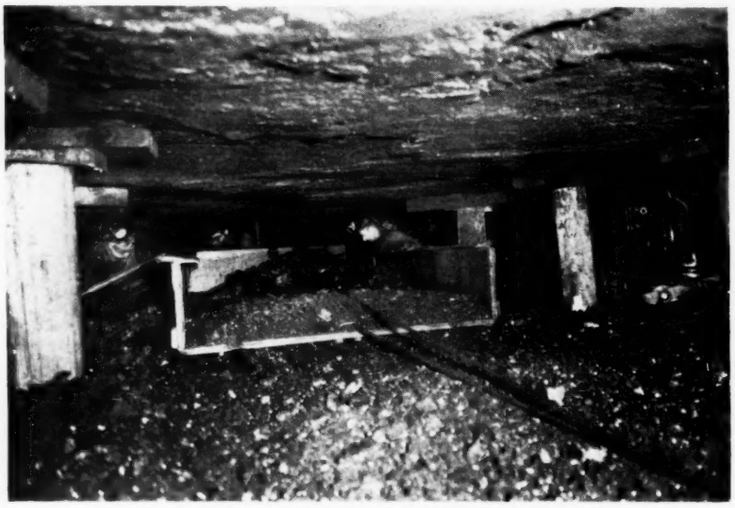


Fig. 5—Hand loading a 4x8-ft. scooter in 28-in. coal.

Jeffrey A7 electric coal drills, 16 Jeffrey 12-in. Type 61 blowers each with 225 ft. of 12-in. flexible tubing ("Ventube" and "Mine-Vent"), and four Brown-Fayro Model HKL 5-hp. automatic car-spotting hoists.

The three scooter gathering conveyors and the six conveyors used for regular development are 15-hp. 300- to 350-ft. Jeffrey units. The 26-ft. face conveyors are Jeffrey 61-DC machines. Only in the absence of sufficient development for scooter mining is another 300-ft. 61-W conveyor used to drive the triple heading entry ahead of a scooter section and thus discharge to a scooter gathering conveyor. A 61-AM Jeffrey conveyor is used in the cross cut from aircourse to center heading, where, by hand loading into mine cars, the top rock is taken after the heading conveyor has been moved to advance an aircourse. Chain-pillar crosscuts are opposite each other (Fig. 1) and thus become the room necks. So far, low places encountered in the coal seam have limited room-panel heading lengths to less than 2,000 ft., which is the maximum projected for the system.

Scooter boxes and ramps were built by the Enterprise Wheel & Car Corporation from designs furnished by the coal company. Ramps for the larger boxes are 19 ft. long and are made in three sections; those for the smaller boxes are 14 ft. long in two sections.

All power for inside operations is 250 volts d.c. Signaling from each face to the scooter hoist on the entry is done with a 250-volt heavy-duty weatherproof pushbutton which lights a 94-watt locomotive headlight lamp mounted in a deep reflector at the hoist. A lighted lamp means "pull the scooter," and short flashes communicate other messages.

Fig. 6—A machine-loaded 5½x11-ft. scooter dumps into a mine car and just fills it.

OVERLOAD PROTECTION

For Power Distribution System

Prevents Costly Delays in Conveyor Mining

By H. P. CHANDLER
Development Engineer
Ohio Brass Co.

WITH the rapid trend toward conveyor mining in many producing districts there has been a steady development of control, protection and connection devices to handle the electrical requirements of such systems. Greater emphasis also has been placed upon sectionalization or the localizing of electrical breakdowns so that they do not impede production in large sections of the mine.

In the past, before sectionalizing became such an important aspect of coal-mine electrification, electrical breakdowns frequently stopped production for an entire shift and, in extreme cases, for several days. In conveyor mining, where so much capital investment is wrapped up in motors, conveyors, cutters, drills, etc., in each working place, sectionalization assumes an ever greater importance. To capitalize fully on this equipment it is necessary to have adequate voltage at the face and reasonable assurance that such voltage will continue.

If trolley haulage is used in entries leading to the working faces, rails must be adequately bonded and a properly balanced trolley and feeder be available. Cables leading from the feeder system to the machinery must be protected from burnouts due to overloads by fused trolley taps. If

Why jeopardize performance of machines with inadequate voltage or costly electrical breakdowns? Proper protection and control systems, declares the author, are relatively inexpensive. Mr. Chandler offers two wiring hook-ups to prove his point. One is used with non-permissible face equipment and trolley haulage to the entrance of the working place; the other, with permissible equipment and a mother conveyor.

junction or distribution boxes are used to further facilitate distribution of power to the various machines, fuse protection should be provided for each circuit leading from the junction box to the individual machine. In other words, should an overload occur at any point in this system, the resulting strain on the electrical "supply line" will be immediately relieved by overload protection governing the individual devices.

Fig. 1 shows a schematic conveyor wiring hook-up now in use at a large operation to afford this protection. The equipment at this face is non-permissible, and trolley haulage is used up to the entrance of the working place instead of a mother conveyor. Three circuits lead from the trolley haulage system to the machinery in the room—positive, negative and safety ground. Plier-type clamps provide quick, easy connection facilities to the rail for the latter two circuits.

Fuses Protect Circuits

A fused trolley tap protects the positive cable leading to the primary junction box from which emanate three 3-conductor cables leading, respectively, to blower, room-conveyor starter and secondary fused multiple-junction or distribution box at the face. Each of these circuits is properly fused. The starter controlling the 10-hp. motor of the room conveyor is reversible so that supplies and timber may be taken into the room.

The 3-conductor cable leading to the secondary junction box at the face supplies power for cutting machine, drill and the 5-hp. face-conveyor motor. Each circuit is further protected by fuses in the secondary-junction box, which in this case is the open type. Both primary- and secondary-junction boxes have switches which interlock with the lid so that when fuses are changed or cable plugs removed the power is off. The automatic d.c. motor-starter controlling the motor of a 5-hp. face conveyor is non-reversible.

Fig. 2 illustrates much the same type of connection hook-up except that here permissible equipment is used at the face and a mother conveyor is substituted for trolley haulage. In this set-up, further sectionalized protection is provided by the circuit breaker on the master control panel. Two pushbutton automatic d.c. starters which control an elevator motor and a hoist or tugger motor also are located on the master control panel. Controlling the 15-hp. motor of the mother conveyor is a reversible automatic d.c. motor-starter, permitting the transportation of materials and timber into the working place.

At the entrance to the working place a through-type multiple-junction box was substituted for the fused trolley-tap and rail clamps used for trolley haulage connection in Fig. 1. Cables leading into the room are continuous, meeting permissible requirements. At the face, a gas-proof 3- or 4-circuit distribution box provides protection for the three circuits leading to cutting machine, drill and 5-hp. face conveyor, and a gasproof starter, non-reversible, controls and protects the motor of the face conveyor.

Considerable variation, of course, can be made from these typical layouts. In some cases, interlocking sequence control may be substituted if conditions warrant.

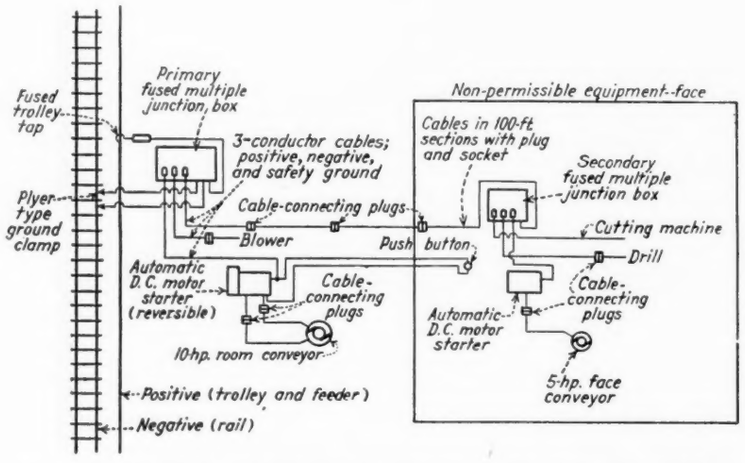


Fig. 1—Schematic wiring hook-up for conveyor mining with non-permissible equipment at face and trolley haulage to entrance of working place.

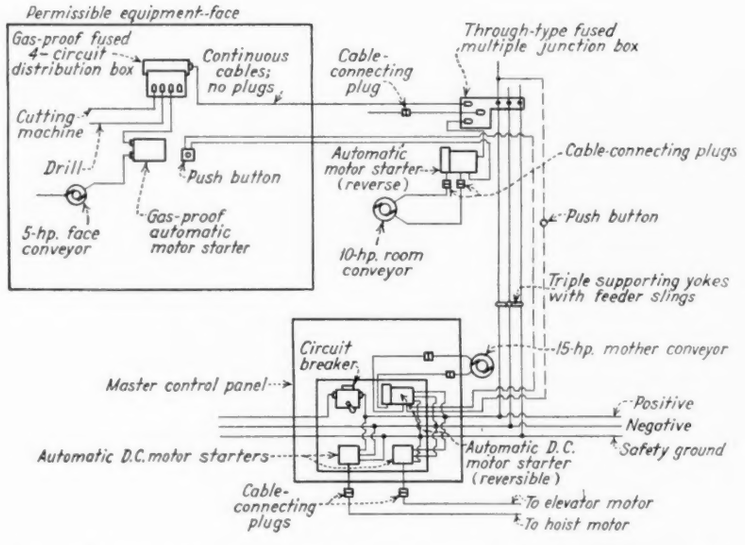


Fig. 2—Schematic wiring hook-up for conveyor mining using permissible equipment at the face and a mother conveyor in place of trolley haulage.

MECHANICAL MINING

With Non-Explosive Breaking Aids Feature Washington Shaft Mine in Colorado

By IVAN A. GIVEN
Associate Editor, Coal Age

DESIGNED for an ultimate output of 2,000 tons per 7-hour shift from a clean sub-bituminous seam, the new Washington mine of the Clayton Coal Co., in Weld County, Colorado, 16 miles north of the Denver City and County limits, is set up for completely mechanical operation using carbon dioxide and hydraulic pressure to break down the coal, supplemented occasionally in the summer season by permissible powder. The output, moving to market under the trade name "Washington," is prepared in a modern steel tipple especially designed for maximum efficiency not only in screening and cleaning but also in loading either truck or rail equipment.

The Clayton Coal Co., headed by H. B. Crandell, with C. W. Brown as sales manager, opened its first operation in the Denver Basin, the Clayton mine, in 1920, following it with Morrison mine in 1930. Both properties are mechanical operations and are equipped with modern cleaning and screening plants designed for both truck and rail loading. Work on the airshaft at the new Washington mine was started in January, 1940; ground was broken for the hoisting shaft on March 5. Sinking was done by the company's operating staff, headed by John G. Sidle, general superintendent. Robert Johnson is mine foreman, T. W. Miller is night foreman, R. W. Young is top boss, Robert Shaw is master mechanic, and Samuel Sidle is chief electrician.

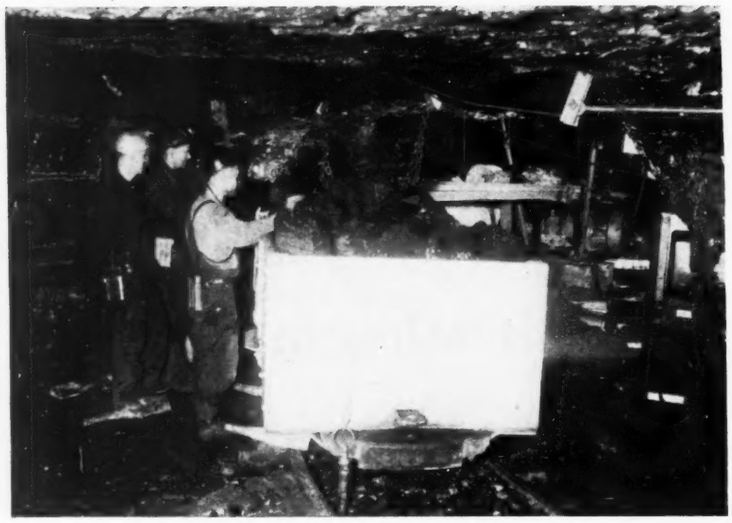
Production comes from a 2,800-acre tract of clean Laramie coal under 370 to 500 ft. of cover, making Washington mine the deepest in the Denver Basin. Average coal thickness is 10 ft. About 1 ft. is left in the top in rooms and 2 ft. in headings as additional support for the good shale top. Further protection is afforded by regular timbering, using a minimum of two rows of props on each side of the conveyor in rooms. Employees are provided with new Edison Model P electric cap lamps, and personal protection includes safety hats and safety shoes. The coal is mined down to the floor, which is a hard fireclay. Average dip is about 1¼ per cent southeast. Water flow is moderate.

Sinking of the hoisting shaft, 10x14 ft. inside the lining and 435 ft. deep to the top of the coal, required 70 days. Initial sinking and installation of the concrete collar 20 ft. down and 2 ft. thick took from March 5 to March 15, 1940. Sinking two shafts and timbering one was the order thereafter. The material consisted mainly of shale, soapstone and other soft rocks, with occasional sandstone ledges and boulders, the latter offering perhaps the most difficulty of all. Crews comprised an engineer, a topman and three sinkers. Average depth of a round was 5 ft.

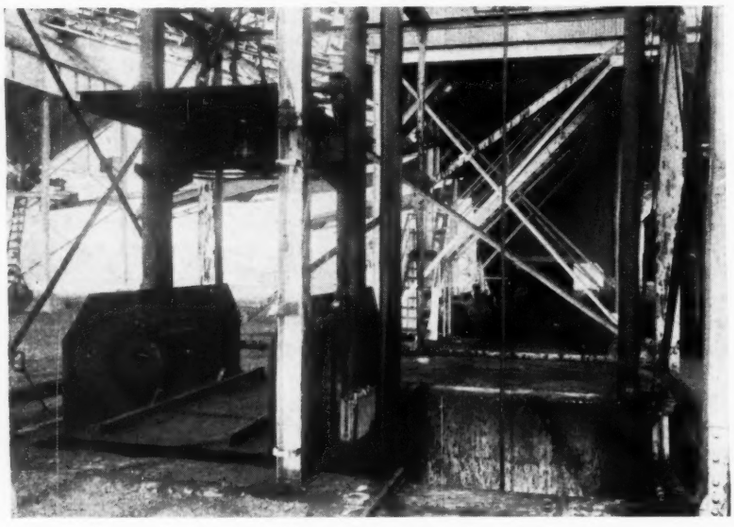
Sinking equipment, in addition to compressor and drill equipment, consisted of a timber headframe with a small bin and truck-loading chute, a ¾-cu.yd. bucket and a 60-hp. No. 6 Vulcan single-drum electric hoist. Water was removed by bailing.

Below the concrete collar, the shaft was lined with 5x12-in. No. 1 Oregon fir to the bottom. The sidewalls were reinforced by 6-in. channel sections 2 ft. long set vertically in notches in the lining. Buntons also were made of 5x12's, with the ends set tightly in the channels. The buntons were spaced 1 ft. apart, permitting free passage of air between the compartments during hoisting. In addition to facilitating air passage, the construction also was cheaper and resulted in

Room face in Washington mine with the hydraulic breaker in action.



New cars being loaded by shaker equipped with duckbill.



Alloy cages are used at Washington. This view shows part of the automatic guide lubricators.

a clean shaft. Guides are 5½x7½-in. vertical grain No. 1 Oregon fir, and are lubricated by Kuncis equipment (oil reservoirs with vanes actuated by air movement following passage of the cage to release oil onto the guides). Timbering on the loaded side at the bottom also was done with Oregon fir, and the installation is split up into sections about 4 ft. long so that one section can be renewed, if it becomes necessary, without disturbing the rest.

The airshaft was sunk first to permit development of the bottom while sinking the hoisting shaft. Size of the airshaft is 8x10 ft. inside the lining. Depth is 378 ft. Sinking equipment was the same as at the hoisting shaft except that temporary facilities were installed for handling development coal. The plant, including headframe and hoist for an emergency cage in one of the compartments, was left in place for use in case it becomes necessary in the future. Time required to sink the airshaft and timber it in the same fashion as the hoisting shaft, except that buntons were placed on 3- instead of 2-ft. centers, was 57 days. Ventilating air is provided by a 7-ft. Aerodyne fan designed for a maximum output of 140,000 c.f.m. with a 25-hp. motor. Present output is about 40,000 c.f.m. with a 7½-hp. motor. Underground, all but an occasional unavoidable door will be eliminated by proper driving of entries and the use of overcasts.

Clayton management finds steam the most satisfactory hoisting power, and consequently the surface facilities include a hand-fired boiler plant and an engine-driven generator to supply 275-volt d.c. power to underground equipment through a borehole. Additional generating equipment will be installed as production increases. Power for the tipple and other surface equipment (440 volts) and for lighting (110 volts) is purchased from the Public Service Co. of Colorado. In addition to a complete machine shop under construction at the time this article was prepared other surface facilities include a concrete and tile bath and lamphouse and a concrete and tile weighing and mine office.

Total hoisting distance is 510 ft. The hoist was obtained from the No. 12 mine of the Sahara Coal Co., in Illinois, and is a Litchfield unit with 6- to 9-ft. stepped drums driven by 24x36 engines. Hoist capacity is 2½ cars (2½ tons per car) per minute. Leschen 1¼-in. preformed ropes are used. Holmes Bros. "Toncan" alloy cages were installed, use of the alloy saving about 3,800 lb. and cutting cage weight to 10,000. Mine-car weight is 2,400 lb.

Will Mine on Retreat

The general operating plant at Washington mine is based on driving north, east, south and west to the boundaries and then mining on the retreat. In the meantime, coal to supplement entry production comes from a special section approximately 800x 1,000 ft. and surrounded by adequate barriers near the shaft bottom. All entries are made up of three headings 9 to 10 ft. wide on 50-ft. centers. This includes room entries, where the intention is to use the outside headings for haulage and the center for intake air, splitting it both ways at the top.

Rooms will be turned both ways. If present equipment is retained, the practice will be to drive the room entry up, then turn a room on each side, drive it up and extract the pillar, next dropping back to start another room on each side. Thus, the number of working places on a room entry is two. Room width is 30 ft.; centers, 45 ft.; depth, 300 ft.

Production equipment now consists of Goodman G-15 and G-20 shaker conveyors, usually with automatic duckbills, although some are fitted with loading pans; Sullivan CE-7 shortwalls with 6½-ft. (one 7½) bars —all standard chains except one Cincinnati "Duplex" unit; Chicago Pneumatic 472 hand-held electric coal drills (one 474 post unit for hydraulic breaking) fitted with Coalmaster con-

veyor-type augers, heads and bits; new Card 2½-ton endgate-type steel cars with wood bottoms; miscellaneous locomotive equipment; and auxiliaries. The cars are eqiupped with 14-in. cast semi-steel Timken-bearing wheels and weigh 2,400 lb. Over-all dimensions are: length, 111 in.; width, 57¼ in.; height over rail, 42 in. Track gage is 36 in. Main lines are laid with 60-lb. rail, and when finally surfaced and aligned the rail joints will be welded by the steel-arc process.

The principal coal-breaking mediums are Cardox 2-100 tubes with 100-gram heaters and Nos. 12 or 14 disks, loaded with 3 lb. of carbon dioxide, and a duPont hydraulic-mining unit, supplemented by permissible powder in seasons when lump demand falls off. The hydraulic unit (Goodman manufacture) is skid-mounted and includes a pump developing 3,000 lb. per square inch driven by a 15-hp. motor. This pump supplies one long cartridge for regular breaking and also a short one for knocking off humps, overhangs, etc., where the other cartridge would not be as convenient. One of the advantages of hydraulic breaking is elimination of shock to or peeling of the top coal, thus leaving it in condition to provide maximum roof support.

A conveyor crew in heading driving normally consists of three men, two usually at the face and one at the loading point, although all three may work together at certain tasks. The usual performance in places 9 to 10 ft. wide and 8 to 9 ft. high, cut 6 ft. deep, is two to three cuts per 7-hour shift. In 30-ft. rooms, the usual crew membership is four. Where the hydraulic breaker is employed, one man devotes the most of his time to drilling and operation of the pumping unit. Such a crew, using the machine with 7½-ft. bar, gets out 1 to 1½ cuts per shift (75 to 90 tons per cut). Duckbills are used in rooms and also in headings, although in some cases heading men may hand-load onto a pan on the face end of the conveyor.

As is customary in conveyor operation, the working cycle at Washington is continuous. In other words, when one side of a place is cleared of coal, cutting begins, followed by drilling, etc., with conveyor extension and timbering done at the necessary intervals. Hole diameter when breaking with Cardox is 2¼ in., and the number necessary to bring down a 30-ft.-wide place cut 7 ft. deep ranges from ten to twelve, making the output per hole around 6 to 8 tons. When breaking hydraulically a similar place requires 24 to 28 holes, making the output per hole 2½ to 3½ tons. At Washington, to avoid bringing the coal down in large blocks, a hole is broken in two stages, first the front and then the back.

LAST-WORD EFFICIENCY

In Both Truck and Rail Loading

Caps Preparation at New Washington Mine

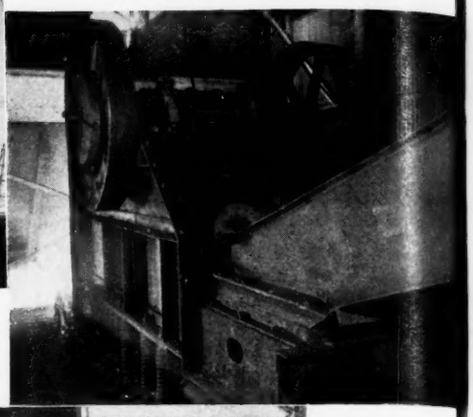
CONVENIENT and efficient loading of both truck and rail equipment, accurate screening, thorough removal of degradation, and elimination of tramp iron from the finer sizes were accorded first rank in the design of the preparation plant serving the new Washington mine of the Clayton Coal Co., in Weld County, Colorado, 16 miles north of the Denver City and County limits. Preparing coal from the Laramie seam, which moves to market under the "Washington" trade name, the new plant includes both shaker and vibrating screens, complete picking facilities for use when it becomes necessary, a pick breaker for reducing lump to smaller sizes when desired, and box-car loaders for lump, egg and pea. Capacity of the plant, on the lines of the Union Pacific R.R., is 300 tons per hour.

By IVAN A. GIVEN
Associate Editor, Coal Age

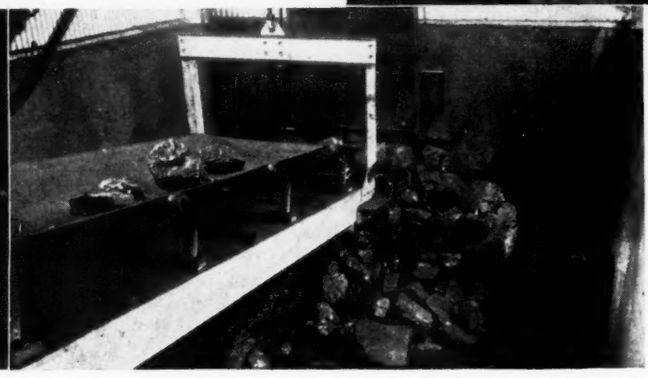
Complete separation of truck and rail loading, with the former on the east and the latter on the west side of the plant, prevents interference between the two and makes it unnecessary for trucks to go onto or across the tracks. The plant design, worked out by H. B. Crandell, president, and John G. Sidle, general superintendent, in cooperation with the Robins Conveying Belt Co., also provides for complete flexibility in loading in that the four larger sizes can go either to the railroad car, to storage bins or directly off the screens into trucks, while screenings sizes have a choice of two routes—to the car or to the truck-loading bins. One factor in this flexibility is the installation of separate conveying equipment for each of the major sizes so that all can be made at once and sent to any desired loading point without affecting production of any other size. Gentle handling is assured by the use of belt conveying equipment except where chain conveyors are employed as distributing units, this chiefly in the case of the smaller grades. Rescreening-type booms are used for loading truck, and degradation screens precede the box-car loaders.

West side, Washington plant. The three screenings bins are at the left and the lump bin is at the end of the main tipple, with egg, pea and modified pea bins at the right. Between the latter bins and the main tipple, trucks can be loaded directly off the screens.

This pick breaker is available for breaking down lump and egg when desired.



Main shaker in Washington preparation plant. with lump belt and bin at far end.



Lump is lowered into bin by belt boom, which also can feed through drop chute in back directly to a truck-loading boom.

Construction of the plant, shaft headframe and certain other auxiliaries was handled by the Eaton Metal Products Co., of Denver, and housing of one section and certain other details were still to be completed when this article was prepared. The coal, so far clean and needing little or no picking, which condition is expected to continue for some time to come, is hoisted on self-dumping cages and discharged from the cars (see article beginning on p. 59) into a Holmes Bros. two-way-dumping weigh basket. Mine weights are obtained from Fairbanks scales. Discharging one way, the weigh basket puts the coal into a chute to No. 1 track and thus permits straight mine-run shipments. Discharging the other way, the basket places the coal on a reciprocating feeder, which in turn deposits it on the main shaker screen.

Three sizes are produced by the main shaker. Lump (usually plus 8 in.) goes off the end of the screen onto a 48-in. boom-type belt conveyor (Shepard-Niles hoist) which ordinarily is employed to lower the coal into a 50-ton bin, from which trucks are loaded by a rescreening-type boom on the west side. Or the boom can be used to bridge the bin and discharge to a rescreening boom on the north side for direct truck loading. The belt boom is equipped for picking if and when necessary.

Lump also may be bypassed into a chute leading to a McNally-Norton Type A pick breaker, where it is reduced to minus 2½ in. or other desired size and discharged to a scraper conveyor for return to the shaker or the vibrating type fine-coal screen (to be described below). Or the lump may be dropped onto a 48-in. belt with horizontal picking section and carried across four tracks to an Ottumwa Type MDL scraper-line box-car loader.

Egg (usually 8x2½ in.) is the second size made on the main shaker, and may be routed to the breaker for reduction; directly to a rescreening-type truck loading boom; via a 48-in. transfer belt (equipped for picking) and a 30-in. main belt to a 50-ton egg bin equipped with Holmes Bros. spiral lowering chute and rescreening-type truck-loading boom; or to a 48-in. belt with horizontal picking section extending across three tracks to a second Ottumwa 24-in. Type A box-car loader on Track 4. No shipments of lump or egg are made in open-top equipment. A third reversible-type box-car loader usable on either No. 2 or No. 3 tracks is planned for the future.

The two belt conveyors feeding the box-car loaders are fitted with retractable heads (see accompanying illustration). Extension or retraction is accomplished by means of rack-and-pinion-actuated sliding carriages, changes in the length of the belts being handled by vertical take-ups. Degradation screens are used between belt discharges and loaders.

A minus 2½-in. resultant is the third size made on the main shaker. This size is discharged onto a 36-in. belt conveyor fitted with a Dings magnetic pulley for removing tramp iron. The belt elevates the screenings to a 6x12-ft. double-deck Gyrex screen (Super-Gyralloy cloth). This screen also can receive crushed coal and degradation from the lump, egg, pea and modified-pea loading points. It separates the coal into 2½x1¼ pea, 1¼x¾-in. modified pea, and ¾-in. screenings.

The ¾-in. screenings are discharged to the center one of three scraper-type cross conveyors used for distribution and mixing, on which they go to No. 1 track for loading, to an 18-in. belt conveyor to the boiler room, or onto a 24-in. belt unit leading up to the screenings storage bins, each with a capacity of 50 tons. These three bins, which are built over No. 1 track, are equipped with chutes and gates for truck loading, in addition to undercut gates for loading railroad cars.

The 1¼x¾-in. size made on the vibrator may be discharged into the center cross conveyor with the minus ¾ to make 1¼-in. screenings for loading on No. 1 track or for elevation via the 24-in. screenings belt noted above to the second, or 1¼x¾-in.,

screenings bin. Or the 1¼x¾, or modified pea, may be routed to another scraper-type cross conveyor for loading on No. 2 track, discharge to the boiler conveyor, or routing to 24-in. belt feeding the modified pea truck-loading bin (50 tons), also equipped with rescreening-type loading boom.

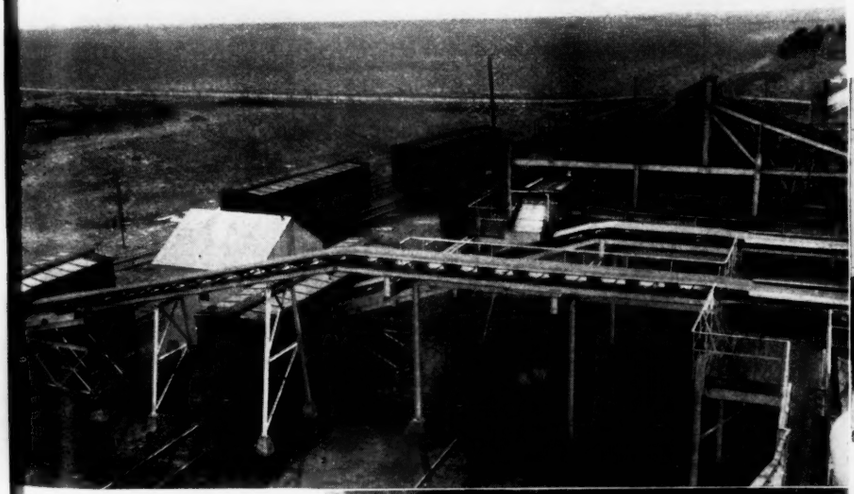
Pea, or 2½x1¼-in., off the top deck of the vibrator also may be discharged to the center cross conveyor to make 2½-in. screenings for loading on No. 1 track or routing to the third 50-ton screenings bin via the screenings belt. If not remixed, the pea size is routed to a 48-in. reversible belt equipped for picking. Operated in one direction, the belt carries the coal to the cross belt feeding the box-car loader on the No. 4, or egg, track. In the opposite direction, the belt carries pea to a chute to No. 3 track or to a third cross conveyor feeding either the boiler belt or the belt supplying the pea bin—fitted with Holmes Bros. spiral lowering chute and rescreening-type truck-loading boom. Pea and modified pea also may be taken from their respective cross conveyors for direct loading by additional rescreening-type booms.

To recapitulate, egg, pea, and modified pea truck-loading bins are built in one group west of the main tipple. The bay between bins and tipple is bridged by the egg, pea and modified pea belts and also is available for loading trucks directly from the screens via rescreening-type booms. Pea and modified pea are brought across from the east side of the tipple by the cross conveyors referred to previously. At the north end of the main tipple and in line with the shaker is the lump bin.

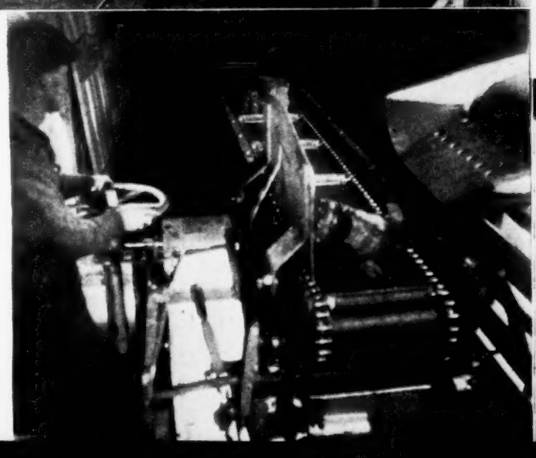
Complete separation of rail and truck loading, plus maximum flexibility in routing the coal to either railroad cars or truck-loading bins, is a major feature of the new Washington mine. Facilities include shaker and vibrating screens, degradation screens for all screened sizes, box-car loaders, a pick breaker, magnetic pulley, booms for loading trucks, complete picking facilities for use when it becomes necessary, and belt conveyors to promote gentle handling of the coal.

In a separate installation still further north and over No. 1 track are the bins for 2½-, 1¼- and ¾-in. screenings, which are connected to the main tipple by the 24-in. screenings belt. Under this arrangement, all trucks are loaded west of the tipple and railroad tracks, where a good yard with plenty of clear space for maneuvering is provided. To further facilitate loading of trucks, two sets of scales are provided, one for incoming trucks and the other for outgoing. The platforms will hold truck or tractor-semi-trailer jobs up to 34 ft. in length. Rail shipments are weighed on Fairbanks track scales.

Steel bins and a steel framework with corrugated galvanized roofing and siding characterize the design of the Washington preparation plant, under the supervision of R. W. Young, top foreman. Exclusive of three Shepard-Niles boom hoists, the equipment is operated by 29 Westinghouse 440-volt ball-bearing motors ranging in size from 1½ to 25 hp. Westinghouse De-ion linestarters are employed, and all controls, except starting buttons for the two belts feeding the box-car loaders, are centered in one push-button panel alongside the main shaker. Power for tipple operation is purchased from the Public Service Co. of Colorado. Power transmission equipment includes Falk reducers and Condor (Raybestos-Manhattan) V-belts. Conveyor belts were supplied by the Hewitt Rubber Co. Flat picking idlers are installed on the horizontal sections of the two belts feeding the box-car loaders and on the reversible belt at the end of the Gyrex screen.

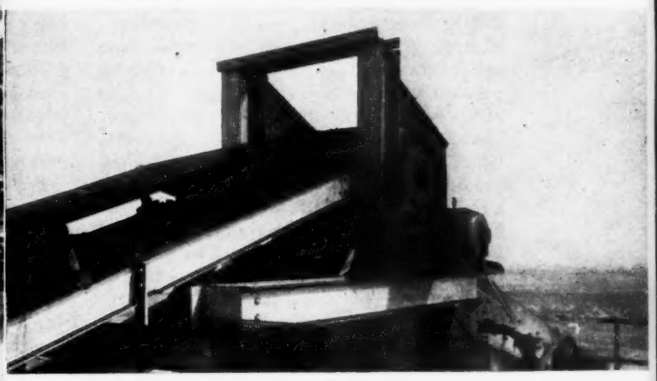


East side of plant, not yet roofed over. In background is magnetic pulley and vibrating screen. In foreground are transfer belts with horizontal picking sections feeding the box-car loaders. Part of the screenings belt shows at the extreme right.

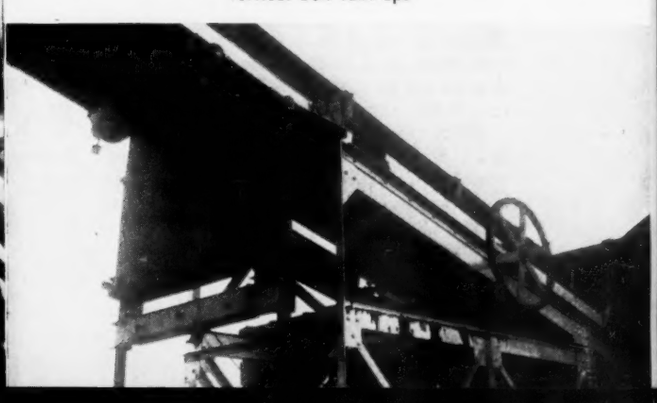


Box-car loader placing lump in a car.

Screening of the smaller sizes is handled by this vibrating unit preceded by a magnetic pulley.



Discharge ends of the transfer belts feeding the box-car loaders can be extended or retracted by means of a rack and pinion and vertical belt take-up.



NEW LIGHT ON OLD QUESTIONS

Keep Damp Mine Roof Rock From Spalling By Spraying With Coal-Tar Paint

By **GEORGE M. BROWN**
Mining Engineer
McAlester, Okla.

ALL mining men are familiar with the sweating of mine roofs, a phenomenon which begins with the first hot days of summer and lasts until fall. The consequent spalling of the roof is dangerous and a constant source of expense, especially on haulage roads. The only type of roof not affected seems to be sandstone.

This spalling is caused by the reaction of the condensed water with the salts in the rock. The formation of microscopic crystals in the roof causes expansion which spalls or chips off the rock. All mines in Oklahoma having shale roofs are affected by these summer sweats. The quantity of spalling will be governed by the outside temperature of the air, the humidity, and the volume of air entering the mine. At times, if only one shift is working, this spalling will delay mine haulage until late in the morning. At one mine (Hailey Ola No. 1) spalls in a single night covered the main slope tracks to a depth of several inches.

The first mention of the use of paint for preventing roof spalling was made by V. C. Robbins, chief engineer, McAlester Fuel Co., in a descriptive article (*Coal Age*, May, 1937) discussing the results of painting a 60-ft. stretch of roof in the Fernwood mine at Spadra, Ark., with Ebonol, a coal-tar product made by Sherwin Williams Co. He also described results of painting roof in the Sukenis Coal Co.'s mine, Adamson, Okla. The McAlester Fuel Co. has had good results with the same paint in the Banner mine, at Pittsburg, Okla. W. W. Fleming, district mining engineer, Mineral Leasing Division, U. S. Geological Survey, in February, 1939, reviewed results of using paint on mine roofs in a paper at the Fourth Conference, Conservation Branch, U. S. Geological Survey, Salt Lake City, Utah.

Good results thus described led W. P. Mullen, of the Mullen Coal Co., to try Ebonol on the roof in his Julian mine. This mine, operated as a slope, is located on the State Prison Farm one mile west of McAlester, Okla. The slope is opened in the McAlester bed of coal, and the coal, which runs from 46 to 51 in. in thickness, dips 42 deg. at the outcrop and 22 deg. at the 10th east entry, about 2,000 ft. down the slope.

Thirty-five feet above the McAlester bed is an 8- to 12-in. bed of coal. The intervening overburden is a fairly hard gray shale which is uniform in texture but has no definite stratification, and the immediate roof over the coal shows remains of plant stems and leaves. The fracture of the roof, whether brushed or spalling, is conchoidal rather than stratified.

The need for a daily clean-up of haulage roads led Mr. Mullen to try painting the roof. In April, 1939, he painted one lift on the slope and a length in the 9th west and 10th east headings facing ten rooms. In May, 1940, he painted also the 10th east heading roof to the face for a length facing about 20 rooms. The 9th west painting was extended to a length facing about 51 rooms.

An examination by the writer, July 28, 1940, showed that the roof, where painted, had completely stopped spalling. The painted surface on the slope, on partings, and quite a distance inby on the headings was covered with large drops of moisture which would actually run off when the roof was wiped with the hand. Yet, under these conditions, in no instance was damage to the painted surface apparent. Where weight had come on the roof, some breakage was noted. However, above timbering the paint had prevented spalling effectively. The Ebonol surface is a brilliant black, which does not decrease illumination but rather adds to it. He expects to experiment this winter with a thin coat of aluminum paint over the Ebonol on the roof of heading partings.

Preliminary Work—Obviously the roof rock must be dry when paint is applied. All loose material in the roof to be painted must be removed, which is done by bar and pick. The roof in crosscuts also is trimmed well back toward the permanent stoppings, which at these mines usually are built of stone. It also is important that where the roof is brushed, the side walls should be trimmed of loose material clear down to the coal bed. This work should be followed immediately by painting. Headings in the Julian mine are 9 to 10 ft. and partings 12 to 15 ft. wide.

Painting Procedure—For painting roof in the Julian mine, the following equipment and materials are used: spray gun—DeVilbiss MBC No. 501; tank—5 gal. capacity, DeVilbiss QM No. 686. The spray equipment has 50 ft. of $\frac{7}{16}$-in. hose from air line to tank, 25 ft. of $\frac{5}{16}$-in. hose from tank to spray gun for air, and 25 ft. of ½-in. hose from tank to spray gun for paint. It has been found advisable to add 150 ft. more hose from air line to tank to save time in moving equipment. Air pressure on gun is 35 to 40 lb.; on the tank, 15-lb. pressure is used. For high places in the roof, the gun has an extension handle.

Ebonol costs about 50c. a gallon. If too thick, a reducing liquid is used which costs about 60c. a gallon. A quart of reducer is used to 5 gal. of paint. For painting work, two men are employed, one to operate the gun and one to control the tank and its connections. The workman always should move forward with the air current while painting. Open flames must be kept away from the spray. Operators must wear goggles, hoods, gloves and respirators. Usually one coat of paint suffices, although some of the partings are partially repainted. Hose, gun and valves are cleaned daily by blowing distillate (diesel fuel) through them.

Costs—As already stated, the first paint-

Slope and crosscuts:			
Estimated roof surface.....		1,500 sq. ft.	
Two partings:			
Estimated roof surface.....		3,000 sq. ft.	
Headings:			
9th west, about.....	1,750 ft.		
10th east, about.....	1,050 ft.		
	2,800 ft.		
Estimated roof surface.....		32,500 sq. ft.	
Total		37,000 sq. ft.	
Labor, trimming roof:			
Slope and 9th west heading, 3 men, 3 days at $5..	45.00		
10th east heading, 3 men, 2 days at $5.....	30.00		75.00
Paint, 160 gal. at 50c.....	80.00		
Reducer, 10 gal. at 60c.....	6.00		86.00
Labor, Painting			
2 men, 5 days at $5.....			50.00
			211.00
Miscellaneous, 10 per cent.....			21.00
Cost per sq. ft.—0.625c. (⅝c.)			$232.00

Mines Which Have Successfully Applied Paint to Roof to Prevent Spalling

Company	Application Date
Fernwood Mine, McAlester Fuel Co., Spadra, Ark.	May 18-19, 1935 (About 600 sq.ft.)
Sukenis Mine, Sukenis Coal Co., Adamson, Okla.	May 15, 1936 (17,200 sq.ft. at cost of 1.4c. per sq.ft.)
Banner Mine, McAlester Coal Mining Co., Pittsburg, Okla.	
Julian Mine, Mullen Coal Co., McAlester, Okla.	April 1939—May 1940 (37,000 sq.ft. at cost of 0.625c. per sq.ft.)

ing was done in May, 1939. The area involved was the lower slope roof from the 9th west to 10th east heading, two partings and in front of ten rooms inby—a length of 400 ft.—on each of the two headings. In May, 1940, the painting was extended to cover the roof of the 800 ft. of heading giving access to 20 rooms on the 10th east heading and the roof of the 1,500 ft. of heading adjacent to 40 rooms on the 9th west.

Cost per square foot checks closely the estimate by Mr. Mullen, who figured $\frac{3}{8}$c. per square foot for labor and $\frac{1}{4}$c. per square foot for paint. A 60-ft. strip of hard and slaty roof heading in the Fernwood mine of the McAlester Fuel Co., at Spadra, Ark., painted five years ago shows on close inspection no signs of spalling. On either side of the painted section, the roof has spalled or weathered to a depth of at least 18 in.

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How to Inculcate Safety to Mine Workers At Their Working Places*

By **W. D. WALKER**
Safety Engineer
Butler Consolidated Coal Co.
Wildwood, Pa.

RECENT laws have tended to restrict education to the working place, for only meetings sponsored by government agencies or recognized independent organizations can be held outside working hours unless attendance is absolutely voluntary and discussion is strictly confined to the hazards of the particular job or to the personal responsibility of employees in performing it safely. Experienced as well as new men must be trained, for mechanical development has introduced new hazards and the experienced are found to have as great an accident frequency as the inexperienced.

Probably one of the best methods is that put in operation by the Phelps Dodge Corporation, which put aside a standard section of the mine to be operated by a carefully selected teacher whose primary interest was not production but use of, and instruction in, safe methods. Every newly employed man, whether experienced or not, had to pass through this training school.

Too often the foreman is not versed in safety, and he cannot teach what he himself doesn't know. A new employee at the Wildwood mine gets a few instructions at the section foreman's office as to the practices in general use. Then he is placed under direct charge of an older workman who looks after his safety and training during the probation period.

The foreman then accompanies them both to their first working place to help in starting the new man in the right way, and follows this with frequent visits thereafter. A section office or meeting place for all the men, with benches and lights, is maintained near the working face with first-aid material available and section maps, posters and general information posted on the walls. Here, safety meetings are held and general instructions given.

In the cycle of mining at Wildwood is one hand-labor job, from which the general hazards have been removed or remedied by other more specialized workmen. In this the new men serve a short apprenticeship, and they are then ready to get specific instructions as to the hazards of the kind of mechanized work they have to undertake.

At our mines, safety has been advanced by these provisions: (1) The number of working places has been increased so that the men in the various jobs in the cycle are not crowded on one another. In this way, efficiency, safety and opportunity for individual instruction are promoted. There are six to seven different jobs, and eleven working places are provided for each group.

(2) An assistant mine foreman is assigned to supervise the work of each production group of 16 to 18 men. He can visit any job group in a few minutes and make the round of all working places in 15 to 20 minutes.

(3) Shifts are so arranged that the same assistant foreman and workmen are continuously teamed together. This is easy with 5-day week operations, but is a headache while arranging the sixth day. The 6-day schedule still operates, but extra sections and machinery have been provided so that the same number of sections are operating every day, though individual sections are on a 5-day week. With this arrangement, men attain teamwork by working together, and the assistant foreman picks the weak spots in his organization and applies corrective measures. Though new, the principle seems to work well.

*Abstract of address delivered at the regional meeting of the Mining Section, National Safety Council, as part of the Regional Safety Engineering Conference, Pittsburgh, April 2, 1941.

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How to Apply Gunite to Roof What It Costs to Do So*

By **C. W. JEFFERS**
General Superintendent
United States Coal Co.
Cleveland, Ohio

With increased speed in haulage, as much care must be given to the overhead conditions of traveling roads as to the track itself. Gunite is being used to seal the roof from slacking. It is dense and impervious, as proved by its use in reservoirs—absorbing no water and preventing the percolation of salt water, alkalis and acids. On the other hand, concrete is porous; thus destructive agents can enter it and form crystals which, in their development, will expand and destroy the structure of the material. As gunite expands little, cracking and checking is at a minimum.

Too often, only after years of deterioration and much maintenance expenditure is gunite applied, by which time the area to be gunited is excessively large and much preliminary scaling of roof is necessary. Thus it happens that gunite is often condemned as being too costly. In the Pittsburgh No. 8 district, application of gunite is thought to be expensive unless the heading it protects will have a life of six years or more. Hidden savings in gunited headings in competition with timbered headings are: (1) less coal dust deposited on its surfaces, (2) greater ease in rock-dusting, (3) less air resistance, (4) less reduction of heading cross-section, (5) less fire hazard, (6) less danger from derailed trips, as there are no timbers to fall and let down roof, and (7) better illumination.

Sand for gunite should not be too wet and should not be mixed with the cement more than an hour before application. If applied too wet, density and strength will be lacking; delivered too dry, hair cracks will appear. Nozzle of gun should be held 3 or 4 ft. from the face which is being gunited. An excessive velocity of the guniting stream will cause an excessive rebound of material and, if the speed is too great or too little, the gunite will not be sufficiently dense. The first coat should be $\frac{1}{4}$ in. thick, the second $\frac{3}{4}$ in. By volume the mix usually is three bags of $\frac{3}{8}$-in. sand and one bag of cement with 3 gal. of water. This will cover 18 to 20 sq.ft. of surface 1 in. thick, or 135 sq.ft. per ton of sand.

Five men can apply 72 bags of cement and 10 tons of sand in 7 hours, or 1,325 sq.ft. per shift. This does not include scaling. Cement cost 3.16c.; sand, 1.19c.; and application, 2.62c., or a total of 6.97c. per sq.ft. Scaling cost 1.90c. per sq.ft. Power, depreciation and supplies added 0.60c. A dime, therefore, would cover all these costs.

Men should be protected by respirators against sand particles precipitated in the air in mixing and application. The nozzleman should wear goggles; near the trolley wire, he should wear rubber boots, and a rubber guard should insulate the wire.

Examine gunite once a year and repair the cracks and breaks with a thin coat of the same material. The management of the United States Coal Co. preferred to do its own guniting, as thereby this maintenance could be better arranged; that decision has proved profitable.

*Article read before Mining Section, National Safety Council, at Western Pennsylvania Safety Engineering Conference, Pittsburgh, Pa., April 2.

These Also

At the Pittsburgh regional meeting of the National Safety Council (see p. 80), safety against roof falls and ways of creating a safety spirit had consideration, other than is recorded in this section. J. H. Dickerson (p. 44) shows how crippling are leaks in mine ventilation. The wasted air gets in the way of the air that is going to the face as idlers get in the way of honest-to-goodness workers. A shuttle-car layout at Sheridan, Wyo., on p. 39, will arouse interest, as also many other features in this issue.

QUESTIONS ASKED BY STATE BOARDS

Questions Asked Applicants for Second Class Mine Managers' Certificates, Illinois, 1940

Mine Gases

Q—What do the symbols CO_2 and CH_4 indicate? Where would you expect to find each of these gases?

A—Symbol CO_2 stands for carbon dioxide and symbol CH_4 for methane. Carbon dioxide, being heavier than air, usually is found near the floor and in the lower places of poorly ventilated mines; also in abandoned workings that are not being ventilated. It accumulates at the face of dip workings and other low places in the mine. It is found generally in abundance where timber is present that has reached a high degree of decay. Also in faces that have just been shot.

Methane, being lighter than air, usually is to be found at the roof or at the face of rise workings, also in cavities in the roof of mines where this gas is generated. Accumulations of this gas may be found at the face of advanced entries and other live workings where the air current is not so conducted so as to sweep it away.

First Aid

Q.—How would you render first aid to a person overcome by mine gases?

A.—Remove the person to fresh air as quickly as possible. Loosen tight clothing at the neck, chest and waist. Give artificial respiration, and treat the victim for shock by covering him with blankets, applying warm applications, causing him to inhale through the nose such stimulants as aromatic spirits of ammonia and rubbing meantime the limbs toward the body.

Mining Law

Q.—Under the law of the state of Illinois, how soon must the escapement shaft be completed at a new mine employing three men or less?

A.—In mines employing three men or less, the time for completing the escapement shaft shall not be more than six months from time of hoisting coal.

Q.—At what kind of a mine can a person having a second class mine manager's certificate serve as mine manager?

A.—The Illinois mining laws state that such a person must not act as a mine manager where more than ten men are employed.

Safety Lamp

Q.—What is a safety lamp and explain what it is used for?

A.—A safety lamp is a lamp protected with a wire-gauze chimney of approved construction and one in which all openings for the admission of air to the lamp are covered with wire gauze so that flame cannot pass from within the lamp to the outside atmosphere.

Safety lamps originally were used to enable the miner to work in a gassy atmosphere where an open light would be unsafe. In recent years, the electric cap lamp has largely replaced the safety lamp for this purpose. Safety lamps are now used chiefly to detect methane and black-damp.

Anemometer

Q.—What is an anemometer and for what is it used?

A.—The form of anemometer generally used in mining practice is that known as the "Biram," consisting of a metal ring within which is a rotating unit with blades inclined to the plane of rotation. The air striking the inclined blades rotates the unit, the number of revolutions being recorded on the face of the dial by means of a series of gears. Each revolution of the vane as then recorded on the dial corresponds to a foot of air travel. This instrument is used to measure the velocity of the air current in mine airways as expressed in feet per minute.

Questions, First Class Mine Managers' Examination, Illinois, 1940*

Power and Air Quantity

Q—What power will drive a current of 60,000 cu.ft. of air per minute through a mine having four equal splits, the airway in each split being 6x8x5,000 ft.?

A—Total rubbing surface in these four splits s (in the equation $p = ksv^2 \div a$) $= 4 \times 5{,}000 \times 2\ (6+8) = 560{,}000$ sq.ft. and the total area is $a = 4\ (6 \times 8) = 192$ sq.ft Horsepower required to produce this ventilation is $H = ksq^3 \div (33{,}000 \times a^3)$ where k = coefficient of friction of air in mine = 0.000,000,02, q = quantity of air delivered in cubic feet per minute, and 33,000 is the number of footpounds in a horsepower. Then, $0.000{,}000{,}02 \times 560{,}000 \times 60{,}000^3 \div (33{,}000 \times 192^3) = 10.36$ hp.

Q—If 27 hp. produces 45,000 cu.ft. of air per minute in a mine, what quantity will be produced if that power is increased to 35.937 hp.?

A.—For the same mine or airway, the quantity of air in motion varies as the cube root of the power producing the motion, or the quantity ratio is equal to the cube root of the power ratio, and, calling the required quantity X, we have

$$\frac{X}{45{,}000} = \sqrt[3]{\frac{35.937}{27}} = \sqrt[3]{1.331} = 1.1$$

$X = 45{,}000 \times 1.1 = 49{,}500$ cu.ft. per minute.

How Siphon Operates

Q—What is the principle of the siphon, and to what height above the upper or supply basin can it raise water? How would you start the flow in a siphon?

A—A siphon is a tube or pipe bent so as to form two legs not necessarily of equal length but always with the outlet below the inlet. (See illustration.) When filled with water, and two ends each immersed in a basin of water or sump, as shown in the figure, the weight of the atmosphere pressing on the surface of the water in each basin will support a column of water in each leg the weight of which is equal to that of an air column of equal sectional area. As the pressure of the atmosphere at sea level is 2,116.2 lb. per square foot and the weight of 1 cu.ft. of water is about 62.5 lb., the theoretical height of water column supported by the atmosphere at sea level is $2{,}116.2 \div 62.5 =$ about 34 ft. In practice, the vertical height of the crown, or highest point, of the siphon above the surface of the water in the upper basin should not exceed 26 to 28 ft., according to the inclination and length of the pipe, being less for a long, flat pipe. For satisfactory operation, the height of the crown preferably should be less than 20 ft.

For successful work, the differences of pressure between the two ends of the siphon must bear a certain relation to size and length of pipe or resistance of flow. To start the siphon, both ends must be temporarily plugged or provided with stopcocks that are closed. The pipe is then filled full to the crown by pouring water into it at this highest point. In doing this, care should be taken to pour the water in slowly, so as to give the air an opportunity to escape from the pipe.

This opportunity will be enhanced if the pipes are straight and smooth. All irregularities hold bubbles that may be small

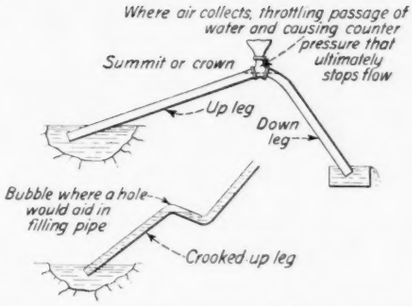
* Continued from *Coal Age*, March, 1941, p. 70.

when water is entering the pipe but become large as soon as the operation causes a vacuum to develop at the crown of the siphon, thus lowering the pressure.

Tapping the pipe when it is being filled helps to loosen such bubbles, which then may rise to the point where the pipe is being filled. Where there are irregularities in the pipe forming minor summits, holes can be drilled at such knuckles, which holes can be left open until the water during filling reaches the hole, when they can be tightly plugged. In this way, a minimum of air will be trapped.

The stopcock at the crown point is closed as soon as the legs are filled with water and, both ends of the siphon being completely submerged in their respective basins, the stopcock at the upper basin is opened first and then that at the lower basin, or both may be opened together, when the water will start to flow through the pipe if the latter is airtight. It is important to control a too rapid flow of the water by partly closing the lower valve when there is a tendency of the pipe to empty itself.

For best results, water should be free of air, for such air, when it reaches the pipe, expands, coalesces, and fills the pipe summit. Presence of air in discharge of stream is regarded as evidence that water is carrying air along with it and not letting it gather at summit, where it will shut off the flow and destroy the vacuum.



Siphon showing where a hole drilled into pipe may be used to remove air. Such a hole should be closed with a pine plug as soon as water gets high enough that it will escape from the pipe at that point.

Chief Mine Electricians' Examination Pennsylvania, 1940*

First Aid

Q.—What knowledge of first aid is required of a person working with or around electrical equipment? Explain in detail how you would satisfy this requirement.

A.—All employees working in connection with electrical equipment shall be familiar with, and know how, to restore persons suffering from electric shock. As soon as the victim has been released from the wire, turn him over with his face downward. Remove all foreign bodies from his mouth. Pull, and keep, his tongue forward.

Turn his head to one side, resting it on his forearm so that his mouth and nose are not in contact with the ground and extend his other arm forward. Loosen his clothing around the neck. Start immediately the Schaffer method of artificial respiration, continuing it until the patient recovers or is pronounced by a physician to be beyond recovery. Heat-giving articles placed about the body will assist in the victim's restoration. (3 per cent.)

Q.—How is it possible for a mixture of air and methane to enter the casing or inclosure of an explosion-proof motor? Explain in detail.

A.—Some methane is likely to enter the interior of electrical equipment by diffusion, but, as the temperatures of the metallic parts of electrical equipment increase when that equipment is operating and decrease when it is at rest, the atmosphere within the inclosure expands and contracts, destroying the balance between the inside and outside pressures. Thus air and other gases tend to leave and enter the inclosure, and methane may be drawn through very small openings into the interior of the electric motor or other electrical equipment. (3 per cent.)

Sustained Overloads

Q.—What effect has a prolonged overload on a motor, cables and connections therewith?

A.—With a prolonged overload, cables, connections and windings of the motor become excessively hot, eventually destroying the insulation. This may cause, directly or indirectly, electrocutions, fires, shocks and gas or dust explosions. (2 per cent.)

Q.—What are the legal requirements for the installation of high-potential cables in Pennsylvania bituminous mines?

A.—All high-voltage armored cables installed underground and not insulated by fireproof protection conduits shall be buried in a trench not less than 12 in. below any combustible material, and where such cables pass under the mine tracks they shall be buried in a trench not less than 36 in. below them. Adequate precautions shall be taken to provide for conducting stray currents from the armor of the cables so as to prevent electrolysis of the armor. Cables shall not be bent to a radius shorter than the minimum specified by the cable manufacturer. (1 per cent.)

Underground Stations

Q.—(a) Define an underground station. (b) What precautions are necessary to prevent electric shock?

A.—(a) Where any motor-generator, converter, rotary converter, rectifier, or transformer is installed underground, it shall be inclosed in a fireproof building of masonry or an effectively grounded approved steel structure. Such buildings shall be provided with automatically closing firedoors, but the automatic features of firedoors may be omitted if a substation attendant be employed. The openings of all such doors shall be so safeguarded by grillwork that the room may be entered only by authorized persons.

In any such underground building, no electrical equipment containing flammable material shall be placed within 8 ft. of any door or opening. All such underground substations containing rotary machinery shall have an attendant constantly on duty while such machinery is in operation, unless adequate control and protection of the equipment is assured by the use of approved automatic devices.

No transformer, circuit breaker, controller or other device or combination of devices containing more than 20 gal. of flammable liquid shall be placed in any underground substation. The substation shall be adequately ventilated. No substation shall be built in any mine until the location, material, construction, and method of ventilation thereof have received the approval of the Secretary of Mines. An underground station is considered as any place where electrical machinery is permanently located. (1 per cent.)

(b) Rubber gloves, rubber mats or other suitable insulating material shall be provided and used by persons so engaged when repairs are made to the live parts of any electrical apparatus, or when the live parts of electrical equipment have to be handled for the purpose of adjustment. (1 per cent.)

Mine Stationary Motors

Q.—(a) What are the legal requirements with regard to underground stationary motors? (b) And the housing of electrical equipment?

A.—(a) Every stationary motor underground, together with its starting resistance, shall be protected by a fuse on each pole or circuit-breaking device on at least one pole for d.c. and on two poles for a.c. motors, and by switches arranged to cut off power entirely from the motor. (1 per cent.) (b) All electrical equipment, except that of an approved type, and except room hoists and track-mounted pumps, which is to remain in any one location for a period of one year or more shall be housed completely in an incombustible structure built of tile, stone, concrete, or of steel plates not less than ¼ in. thick securely joined. (1 per cent.)

Q.—What are the legal requirements regarding the above-ground portions of an installation of high-potential circuits leading underground?

A.—Every a.c. feeder circuit leading underground and operating at a potential exceeding the limits of medium voltage shall be provided above ground with an oil break on each pole, such switch or switches to be equipped with an automatic overload trip and with inverse time overload protection to protect the circuit against a sustained moderate overload. Each such circuit shall be provided also with a suitable ammeter. (1 per cent.)

Q.—When are underground motors required to have a suitable meter to indicate the load on the machine?

A.—When stationary underground motors of 100-brake horsepower or over are installed, they shall be provided with a suitable meter to indicate the load on the machine. (1 per cent.)

* Continued from April, 1941, p. 97.

What Big Iron Valve is famous for economy?

Valve buyers are looking inside to find the features that mean longer, low cost service with this inside Screw I.B.B.M. Gate—JENKINS FIG. 326

Any man who handles valve wheels with wet or greasy hands will appreciate this handy-grip wheel. See how outer rim conforms to the palm grip—inner ring, to the finger grip.

This liberally proportioned gland is built to take it—simply tightening the nuts on two convenient clipped head bolts compresses the packing tightly around the spindle without excessive friction.

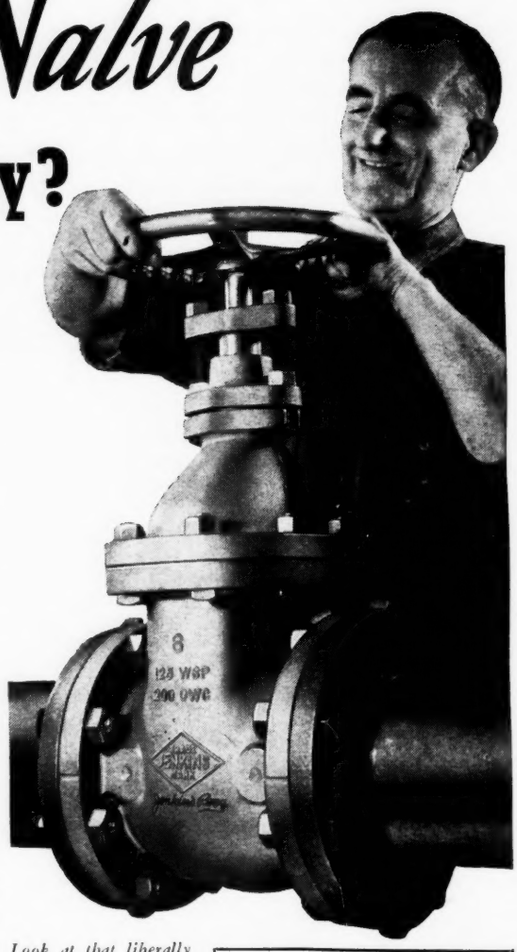
Look at these revealing photos and you'll understand why thousands of veteran Jenkins Iron Body Valves are still giving trouble-free service after 20, 30, even 40 years of operation.

That clear cut section view, for example, shows how Jenkins gives you *reserve* strength at every possible point. Then notice the extra length spindle with deep, liberal threading—inside the bonnet where air-borne dirt can't interfere. Also, how through bolts on the bonnet can be handled with an ordinary wrench—making it an easy job to remove the trimming for cleaning and maintenance.

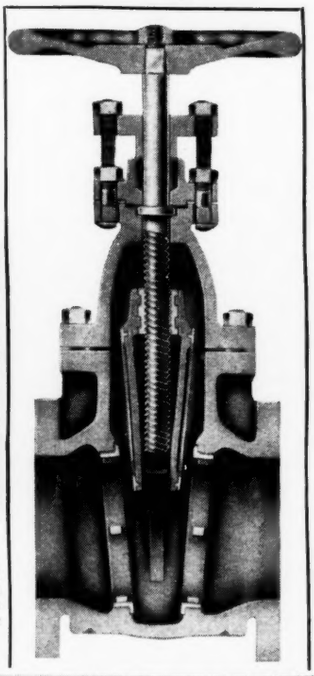
To satisfy yourself still further, ask to see this valve at your supply house. It is available in sizes 1½ to 24 inches—flanged valves to 36 inches. At the other extreme, we have a valve small enough for your watch chain. If you will send your name and address on a post card to Department Y, 80 White St., New York, N. Y., we will send you free this gold-plated valve charm.

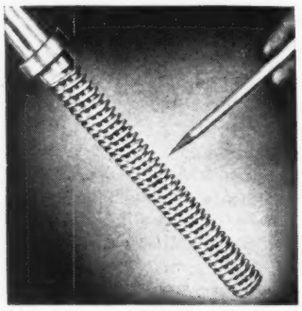
All the world loves a bargain—and when you can get the best in iron valves at no extra cost—that is real economy. Prompt delivery of Jenkins Iron Body Valves is offered by reliable supply houses everywhere.

JENKINS BROS., BRIDGEPORT, CONN.

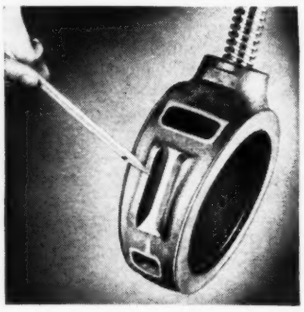


Look at that liberally proportioned body—average tensile strength 34,000 lb. per sq. in.—exceeding A.S.T.M. standards. And the easy-to-service Bonnet — deep enough to permit wedge to lift entirely out of the line of flow.

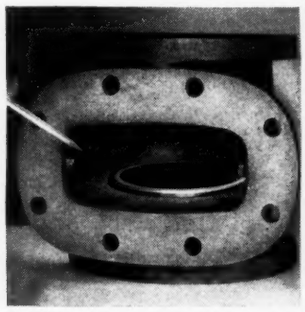




No part takes so heavy a strain as the spindle. That's why Jenkins makes it of manganese bronze,—with husky, perfectly machined threads, correct in pitch and lead to insure tightness and ease of operation.



Notice that this cast iron wedge has heavy bronze face rings—*rolled in.* Then machined to gauge. Also deep guide channels that insure alignment—and minimize chatter when valve is partly open.



Here's why the wedge can't drag—full length guide ribs provide full contact bearing with deep guide channels in the wedge. Note also the renewable bronze seat ring—screwed into the body in all sizes.

LOOK TO *Jenkins* FOR THE BEST IN VALVE DESIGN

WHAT'S NEW IN OPERATING IDEAS

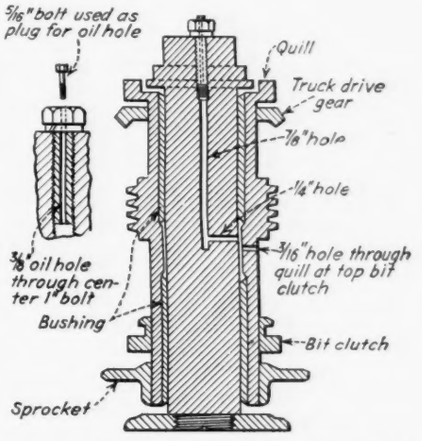
Locomotives Turned and Rebuilt For Safety and Economy

With the installation of big cars behind loading machines, plus a transfer station for reloading the coal into standard cars for main-line haulage and hoisting, Kings mine, Princeton Mining Co., Princeton, Ind., embarked on a program of turning locomotives to get the motorman on the end opposite the car. Thus, he is away from the rear conveyor of the loading machine and consequently is in no danger of being struck by lumps or the conveyor itself. Each big car (see article beginning on p. 47) is accompanied at all times by its own locomotive, the two together comprising a single loader-service unit.

In turning the locomotives, the cables naturally had to be taken off at the cab end, or opposite the usual point. Consequently, the locomotives were fitted with cable conduits extending from the reels to the cab ends. Original conduits were made of pipe, but present practice is to use fire hose, as this has been found the cheapest and best. The hose is clamped in brackets bolted to the locomotive frame, as shown in the accompanying illustration.

Kings mine also has standardized on General Electric floating reels, which are replacing all gear-driven units. Reels in all cases are inclosed for protection in sheet-metal covers made in the mine shop. The cover diameter is sufficient to permit the installation of ¾-in. oak strips at intervals around the perimeter. These strips hold the cable on the reel and prevent it from working out over the top or under the bottom of the reel. By thus protecting cables on the reel and also along the top of the locomotive by means of the fire-hose conduits, their life has been greatly increased. Also, in case there are any bare spots on a cable, the fire hose prevents arcing as result of contact with the locomotive frame.

Turning the locomotives also has made cable handling much easier for the motorman. The hot hook can be hung much closer to the room switch, thus reducing the length of cable which must be strung out along the entry, with a consequent decrease in cutting of cables and the like.

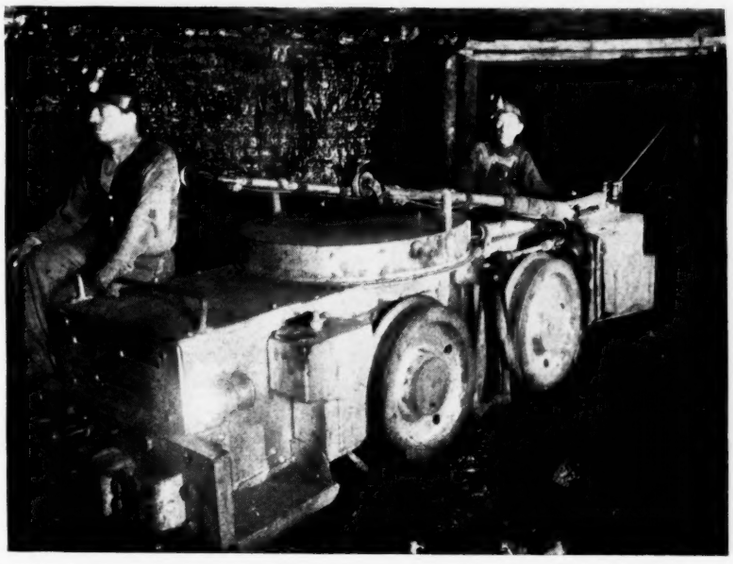


Showing how shaft is drilled for oiling clutch and bit sprocket.

Cutting Machine Lubricated Through Hole in Shaft

Greatly improved lubrication has resulted from drilling the vertical shaft on 35B cutters used by the Cambria Fuel Co., Holsopple, Pa., reports H. H. Wagner, master mechanic and chief electrician. Operators report that oil can be poured in while the machine is running in perfect safety, while the system has been found to insure complete lubrication of the clutch, bit sprocket and even the cutter chain at all times, Mr. Wagner states.

To accomplish oiling in this manner, the vertical shaft is drilled down past the first bushing, as indicated in the accompanying illustration. Then a ¼-in. hole is drilled into the side of the shaft, supplemented by two $\frac{3}{16}$-in. holes just above the bit clutch when it is in cutting position. Oil is introduced through a ⅜-in. hole in the 1-in. bolt in the top of the shaft. A $\frac{3}{16}$-in. bolt is dropped into the hole at other times to keep out the dirt. Complete satisfaction has been experienced with the two machines so far equipped, says Mr. Wagner.



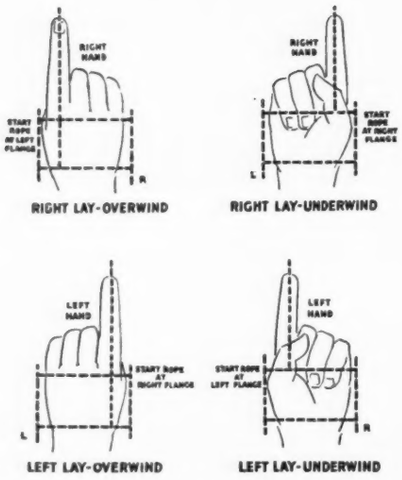
Rebuilt locomotive with reel cover and fire-hose cable conduit. Note safety step.

Starting Point in Drum Reeving Indicated by Closed Fist

There is a complicated rule to indicate at which flange to start in reeving a rope on a smooth drum, points out the American Cable Division, American Chain & Cable Co., Inc., in calling attention to a simple method for use in the field. If started at the proper flange, the rope will wind itself on with the wraps tightly hugging each other so that there is no room into which a wrap from the upper layer might squeeze and cause serious rubbing, scarfing and binding. If the rope is not to be damaged in installation, the wraps must lie close together.

"To reduce the tendency for the rope to spool unevenly, many users are employing the preformed type, since in the manufacture of this type of rope practically all internal torsional stresses are eliminated. One result of 'preforming' is to make the rope resist rotating when passing over the drums and sheaves, as is common with non-preformed. This resistance to rotation and whipping, together with its freedom from 'crankiness,' permits preformed rope to spool much better. However, regardless of the type of rope used, *all* ropes should be properly started on the drum. Here is the rule:

"When a right-lay rope is being underwound on the drum (which is to say it leads from the bottom of the drum), start



Showing how the doubled-up fist and index finger indicate both lead and flange in reeving ropes on drums.

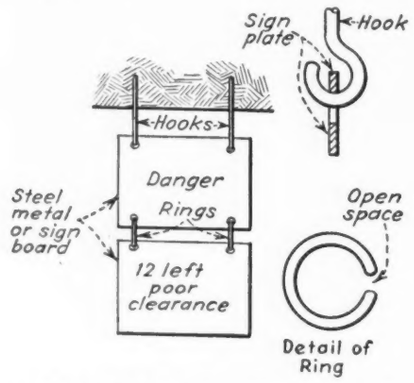
it from the right flange, looking at the drum from the rear. If a left-lay rope, start it from the left flange. Conversely, if a right-lay rope is being overwound (that is, leading from the top of the drum), start it from the left flange. If a left-lay rope (overwound), start it from the right flange.

"That's a complicated rule to remember and, more frequently than not, quick reference to it is not available at the machine. So here is a far simpler rule, using your doubled-up fist to represent the drum and the index finger to indicate the flange. With right-lay rope use the right fist. With left-lay rope, use the left fist. For overwound rope, keep the back of your fist up. For underwound rope, palm up. Pointed to the drum, the index finger will indicate how the rope should lead from the drum and also from which flange. The accompanying illustrations show how easily this rule may be applied."

•

Hooks Placed in Roof Ease Sign Hanging

Convenient places to post or paint signs sometimes are hard to find in a mine, points out E. A. Smith, Prestonburg, Ky., in advocating the use of hooks in the roof. Posting signs on mine props, he states, means that they stay in position only as long as the prop itself.



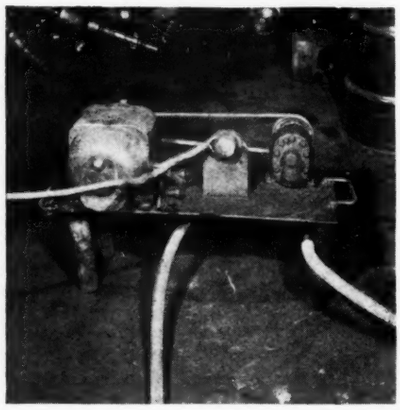
Method of hanging signs in the mine using hooks and rings.

The accompanying illustration shows how pairs of holes are bored in the roof to accommodate small hooks, which are wedged in place. Holes in the metal sign or plate (or other type of sign) permit it to be suspended from the hooks. By the use of rings between them, two or more signs may be hung in one place.

•

Portable Pumping Units Facilitate Movement of Transformers

The oil is pumped from transformers used underground at the Kings mine of the Princeton Mining Co., Princeton, Ind., before moving to lighten them and ease this task. This pumping job is handled by the



This portable pumping unit eases the problem of moving transformers.

portable unit shown in the accompanying illustration, which consists of a motor, Joy hydraulic pump and hoses of the required length. When a transformer move is to be made, barrels are taken in on trucks along with the pumping unit. One hose is inserted in the transformer case, with the discharge to a barrel on a truck. As fast as one barrel is filled, the hose is switched to another. Then the barrels go along with the transformers to the next location, whereupon the process is repeated in reverse.

•

Rail Bender and Straightener Uses Mining-Machine Parts

To straighten several tons of 20-lb. rail reclaimed from one section of the mine, the rail straightener shown in the accompanying illustration was made in the shop of the New Jellico Coal Co., Morley, Tenn., where Howard Sager is manager. In supplying the details, Robert Andrews, electrician, points out that the machine also may be used as a bender.

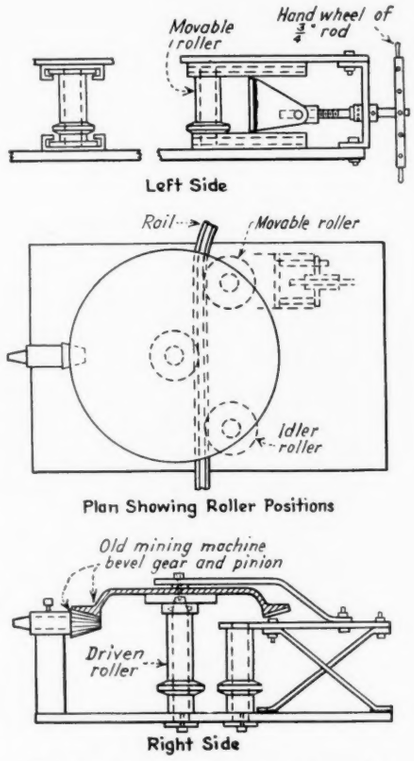
Cost of the machine, exclusive of a gearmotor used to drive it, was $65. The parts were salvaged from an old 35-BB cutting machine. The rollers were welded onto 35-BB worm quills and then were machined to fit the rails. The drive is a 35-BB gear and pinion, the latter cut off just behind the teeth and fitted with a shaft. With the gear motor, speed at the pinion is 46 r.p.m. However, the operating speed is optional, although Mr. Andrews recommends

How Many?

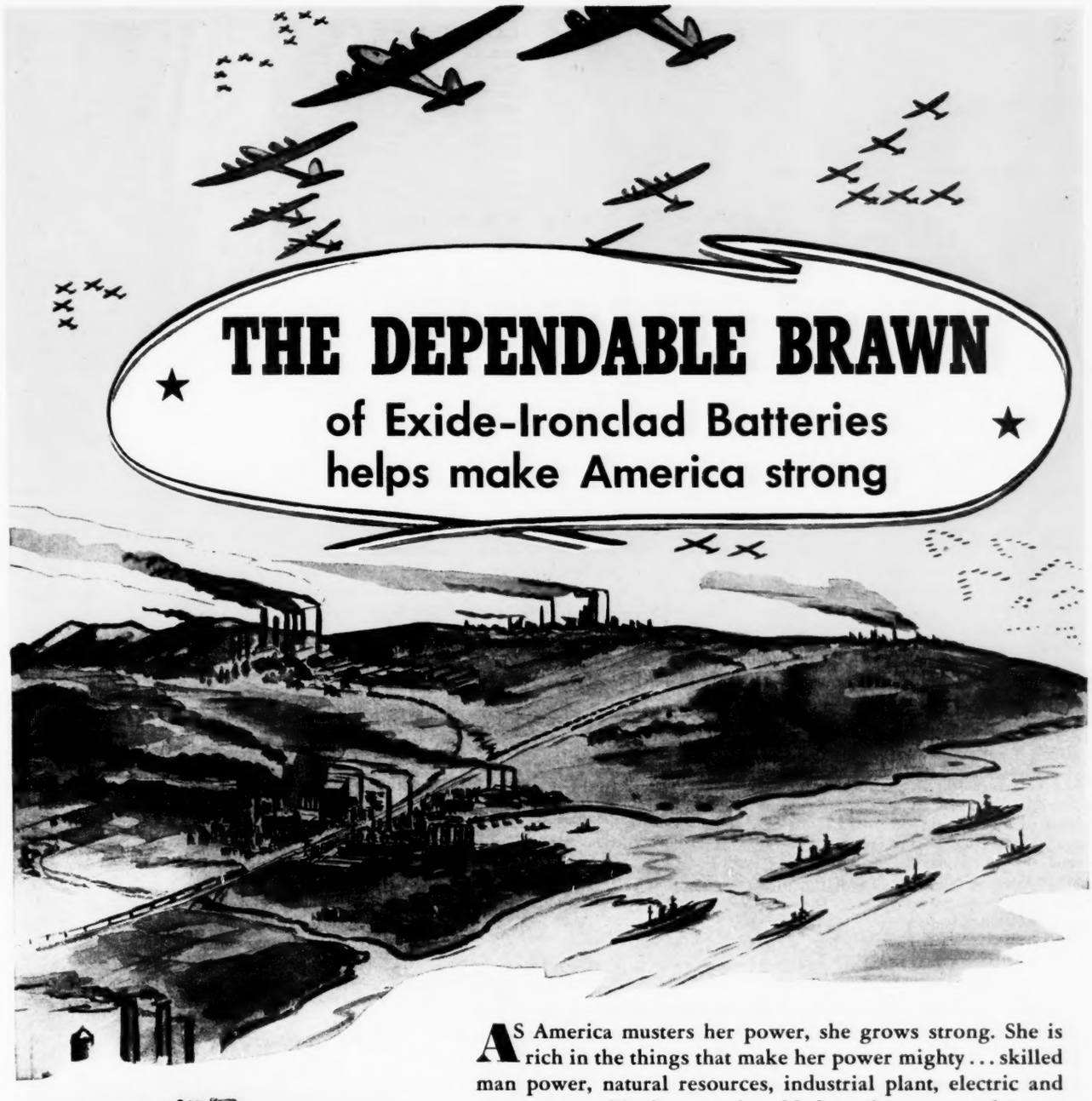
How many things should a man know to handle his job well? The answer might be, "As many as possible." As a practical matter, however, there is a limit to the knowledge a man can or should have, although this limit may be rather elastic. But he should be able to take care of the problems he is likely to meet in his daily work, and this in turn means keeping up with the latest developments in his field. Coal Age runs this Operating Ideas department to assist operating, electrical, mechanical and safety men in this keeping-up process. In this it solicits your help. So if you have a cost-cutting, efficiency-promoting or safety kink that has gotten you out of a hole, send it in, with a sketch or photo if it will help to make it clearer. For each acceptable idea, Coal Age will pay $5 or more on publication.

that it not be too high. The driving medium also may be varied and, in fact, a hand crank can be installed if desired.

The proper pressure for straightening or bending rails is applied by means of a movable roller, which is slid forward or back by operating a handwheel connected to an old brake screw. To make such movement possible, the movable roller is mounted on a carriage running in guides, as indicated in the illustration. Certain braces and other details are not shown in the sketch, Mr. Andrews stating that this will vary with the requirements of the individual builder. By using the handwheel on the adjustable roller, the machine may be



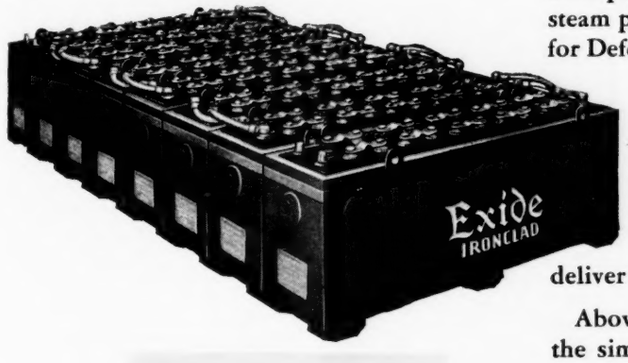
Details of rail-straightening and bending machine.



THE DEPENDABLE BRAWN

of Exide-Ironclad Batteries helps make America strong

AS America musters her power, she grows strong. She is rich in the things that make her power mighty . . . skilled man power, natural resources, industrial plant, electric and steam power. To these can be added another source of power for Defense . . . the power of Exide-Ironclad Batteries to speed up underground haulage.



Exide-Ironclads save precious time in mine haulage. No matter how heavily loaded the cars may be, or how quickly one trip follows another, the power reserve of an Exide-Ironclad is abundant for every demand. Along with giant power, these batteries deliver the consistently good voltage to keep haulage speed high.

Above all, Exide-Ironclads are dependable. Requiring only the simplest minimum of maintenance, they stay on the job year in and year out, helping to cut costs over a period so long that it far exceeds their guarantee. Write for free booklet, "The Storage Battery Locomotive for Underground Haulage."

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THE ELECTRIC STORAGE BATTERY CO., Philadelphia
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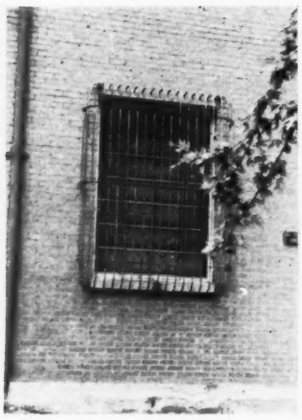
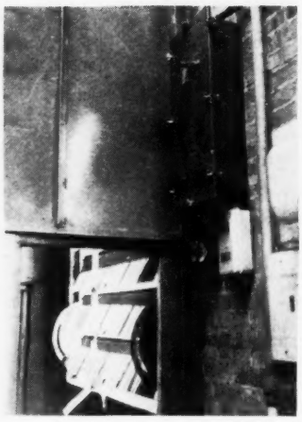


Air inlet from outside.



Louver and dustproof control.

Small section of air filter.

Large section showing oil trough.

operated the same as an ordinary hand bender.

With 20-ft.-long rails, Mr. Andrews states, two men were able to straighten around 140 in seven hours. This is based on dirty rails, which first are run through the machine to break away the hardened mud and then are straightened. With clean rails, Mr. Andrews says, the output would be even greater. On the other hand, using a hand bender, one man would average straightening 25 rails in seven hours.

•

Cooling With Filtered Air Helps Hoist Motor

While the Valier Coal Co., Valier, Ill., was not the first to adopt forced ventilation as a means of cooling the motor on a large electric hoist, experience with a recent installation at this property offers a vivid demonstration of what can be done, writes Fred W. Richart, *Coal Age* special contributor, Carterville, Ill. The motor speed at Valier is slow (55 r.p.m.) and the motor frame is so massive that the fan effect of the rotor is almost nil.

The General Electric 1,350-hp. direct-current motor in question is one unit of a Ward Leonard flywheel hoist that handles approximately 1,000 tons of coal per hour over a hoisting distance of 600 ft. Due to changes in the hoisting load, the motor began to run a temperature, which resulted in the management embarking on a study of methods of keeping it within reasonable limits. Temperature readings of all machines in the electrical system serving the hoist were taken as the first step. Motor temperatures were so high that it was decided to install artificial cooling. The plan finally decided on was based on taking air from outside the building, filtering it and blowing it through the motor.

General Electric and the Robinson Ventilating Co. engineered the job. Construction was handled by mine labor under the supervision of coal-company engineers. The equipment comprised the following:

One 36x25¼-in. Robinson Type H double-inlet fan with 12-gage copper-bearing steel casing and 1 15/16-in. shaft carried in ball bearings.

One 15-hp. Allis-Chalmers "Vari-Pitch" seven-groove V-belt pulley (B-112 belts) with automatic adjustment for varying fan speed from 790 to 622 r.p.m.

One G.E. 15-hp. 3-phase 60-cycle 1,750-r.p.m. 220-volt ball-bearing motor.

One G.E. CR-7006-C-2-J pushbutton control for motor with heavy-duty "Start-Stop" pushbutton.

One Independent Air Filter Co. Model L double-duty automatic self-cleaning non-clogging air filter, 20,400 c.f.m.

One structural-steel house, 8 ft. wide, 11 ft. high, 14 ft. long, with one door at each end of the passageway. Walls are 14-gage copper-bearing steel reinforced by 1½x1½x 5/16-in. angles.

One Robinson 7-plate hand-operated louver, 4-in. channel frame, single 12x54-in. leaves of 10-gage copper-bearing, with No. 14 galvanized-wire screen with ½-in. square openings.

One air duct approximately 29 ft. long of 16-gage steel with 14-gage steel fittings.

One set of air shields for motor, made by General Electric.

Natural air is used without refrigeration. Observed maximum temperatures of the motor fields, before and after ventilation, are given in the accompanying table.

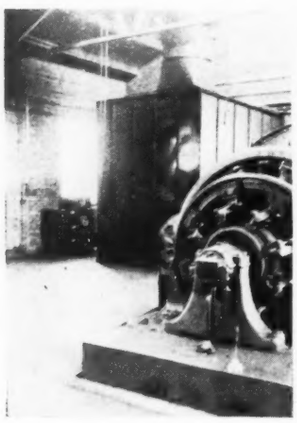
MAXIMUM TEMPERATURES

	Outside		Room		Comm. Field		Main Field	
	C.	F.	C.	F.	C.	F.	C.	F.
Before Ventilation:								
Aug. 18, 1937	35	95	45	113	144	291	113	235
Aug. 19, 1937	34	95	44	111	146	295	108	226
After Ventilation:								
Oct. 7, 1938	24	75	37	99	50	122	47	117
Oct. 8, 1938	30	86	39	102	58	136	45	113

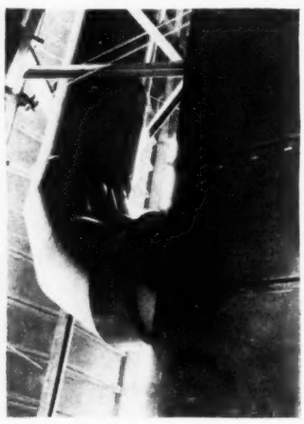
•

Hardwood Jack Blocks Made in Sets

A set of hardwood jack blocks, such as those shown in the illustration, offers the mechanic or maintenance man the oppor-

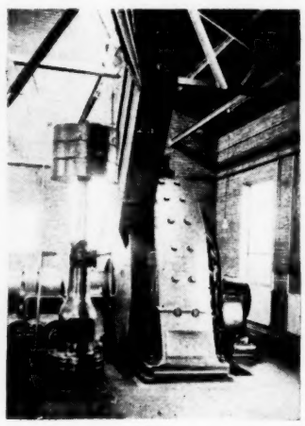


Steel house with outlet to motor.



Outlet to motor from steel house.

Air duct leading to motor.



Motor air shield encircles shaft.

GULF ANTI-FRICTION GREASE
GULF PRECISION GREASE

. . . . FOR BETTER LUBRICATION OF BALL AND ROLLER BEARINGS

WITH machines required to run continuously for longer periods each week, improved lubrication is necessary for better defense against sabotage by friction. To better protect ball or roller-bearing equipped units, Gulf has developed two new greases—Gulf Anti-Friction Grease, recommended for heavy-duty service—and Gulf Precision Grease, for lighter duty and higher speeds.

Both have a comparatively high melting point and are specially prepared for greatest resistance to oxidation and separation.

Gulf's newly developed method of compounding, employing special high-pressure kettles and mixing methods, produces these greases with a relatively smooth, non-fibrous texture, which will undergo a minimum of change in consistency in service.

A wide range of standardized consistencies is available for any method of application or operating condition. Write today for complete information.

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Gulf Oil Corporation - Gulf Refining Company CA
3800 Gulf Building, Pittsburgh, Pa.

Please send me without obligation complete information about your new long life greases for anti-friction bearings.

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Address_____

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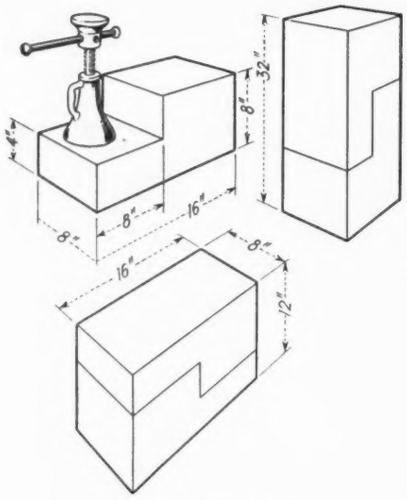


Details of jack blocks.

tunity of making successive set-ups of 4, 8, 12, 16 and 32 in., writes Charles H. Willey, Penacook, N. H. "They are compact and handy and a couple of sets are the answer to a lot of hunting for pieces of timber for a jacking job."

•

Homemade Circle-Cutting Unit Is Accurate and Compact

Originally designed for enlarging several hundred holes in steel plate, the homemade circle-cutting machine shown in the accompanying illustration was built to operate within a very confined space to a tolerance of $\frac{1}{32}$ in. Over-all height of the portable unit, according to *Oxy-Acetylene Tips*, is less than 15 in. "With modifications, the device could be used to advantage for many different types of accurate circle-cutting operations.

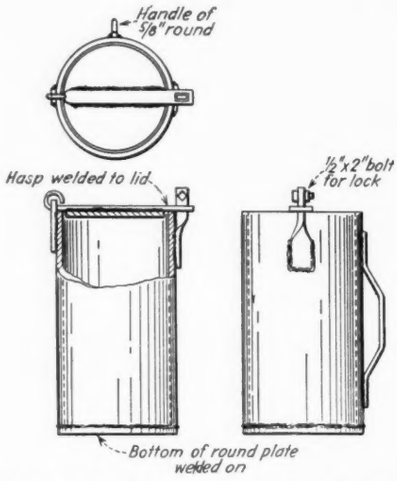
"Although the machine could be operated by an electric motor, if desired, the model illustrated is driven by a hand crank the shaft of which is mounted horizontally above the machine base by two bearings. Worm gears on this shaft engage spur gears on the vertical shafts supporting the two steel turntables. To both turntables the long blowpipe arm is pivoted loosely so that the blowpipe moves in a true circle when the hand crank is turned. Clamping arrangements at the end of the blowpipe supporting arm provide for both vertical and transverse motion of the blowpipe. The transverse motion makes it possible to start cutting in scrap metal and then lead into the desired line of cut.

"The size of the circle possible to cut with this set-up is determined by the diameter of the two turntables, maximum size being approximately equal to turntable diameter. However, adjustment could be provided by slots or a series of radial holes which would permit attachment of the blowpipe arm pivots at various distances from the turntable centers. These holes could be located at the radii most often used on production jobs."

•

Bolt and Hasp Make Lock For Welded Bit Box

A record of eight years of service without loss through physical damage is cited for the bit box shown in the accompanying illustration, which is used by the Cambria



Details of welded bit box with bolt lock.

Fuel Co., Holsopple, Pa. The body of the box, states H. H. Wagner, master mechanic and chief electrician, consists of a piece of 6-in. pipe 12 in. long. The bottom is made of a round piece of plate welded in place. A handle, of $\frac{5}{8}$-in. round, is welded on one side. The lid also is made of circular plate and fits down in the box. Hasp and lid are welded together, and the hinge is made by putting the round part of the hasp through a hole in a plate welded on the side of the box and then bending it into a circle. A slot is made in the other end of the hasp to fit around a tongue. The box is locked by means of a $\frac{1}{2}$x2-in. bolt placed through a hole in the tongue. The box, Mr. Wagner says, will stand extremely rough handling without breaking open and losing the bits.

•

Teeth Shaped While Hot To Repair Gear

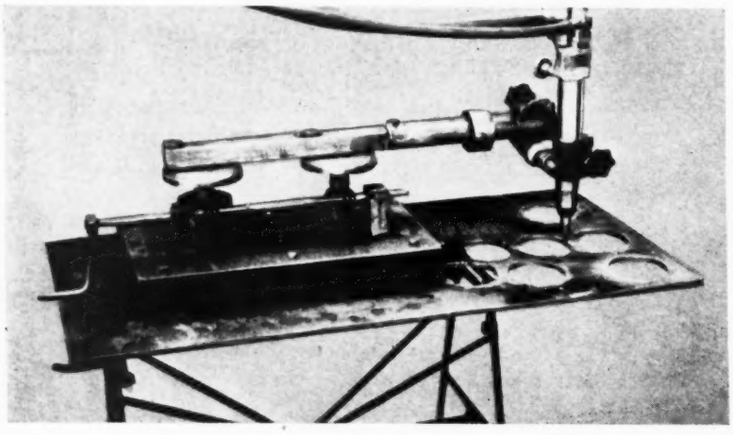
To quickly repair several 8x1½-in. teeth in a bull gear without removing it from the press, relates a recent issue of *Oxy-Acetylene Tips*, the operator built the teeth up to size with No. 25 M bronze rod and shaped them by meshing them while hot with the pinion. High spots were melted down under the blowpipe flame. The gear was returned to service without any additional chipping, grinding or forming of the repaired teeth.

•

Attachment on Bulldozer Shifts Track Quickly

Utilizing a Caterpillar D-8 diesel tractor, engineers on the staff of the Timken Roller Bearing Co., Canton, Ohio, developed the attachment shown in the accompanying illustration for moving track quickly and easily on the steel-mill dump. The attachment hooks over the bulldozer blade, and to move the track the tip is hooked under one rail. The bulldozer then is raised, lifting one side of the track, and the tractor moves ahead to complete the shifting job.

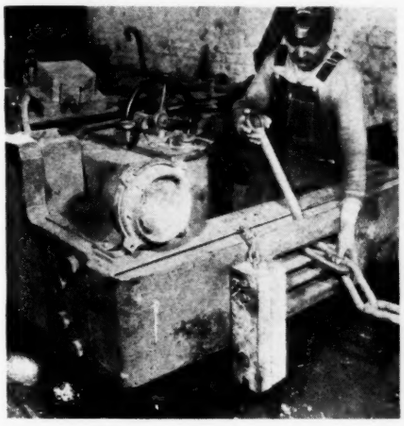
Two views of the track-shifting attachment in service.



This hand-operated portable machine cuts accurate circles within a 1/32-in. tolerance.

Safety Block on Locomotive Prevents Finger Injuries

Mine cars at the Kings mine of the Princeton Mining Co., Princeton, Ind., are equipped with three-link couplings. To reduce the chance of damage to motormen's fingers in coupling, locomotives are supplied with wooden blocks, as shown in the accompanying illustration. The blocks are attached to the locomotives by chains and ordinarily are



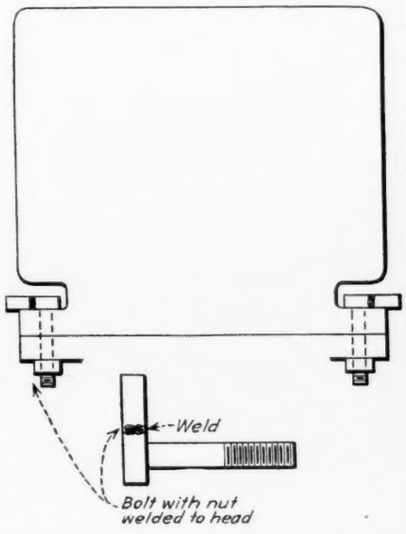
The block keeps cars away and prevents mashed fingers.

carried in the cab. When the motorman starts to couple up to a trip, however, the block is thrown out so that it hangs down along the bumper. Thus cars are prevented from coming up against the locomotive and catching the motorman's fingers.

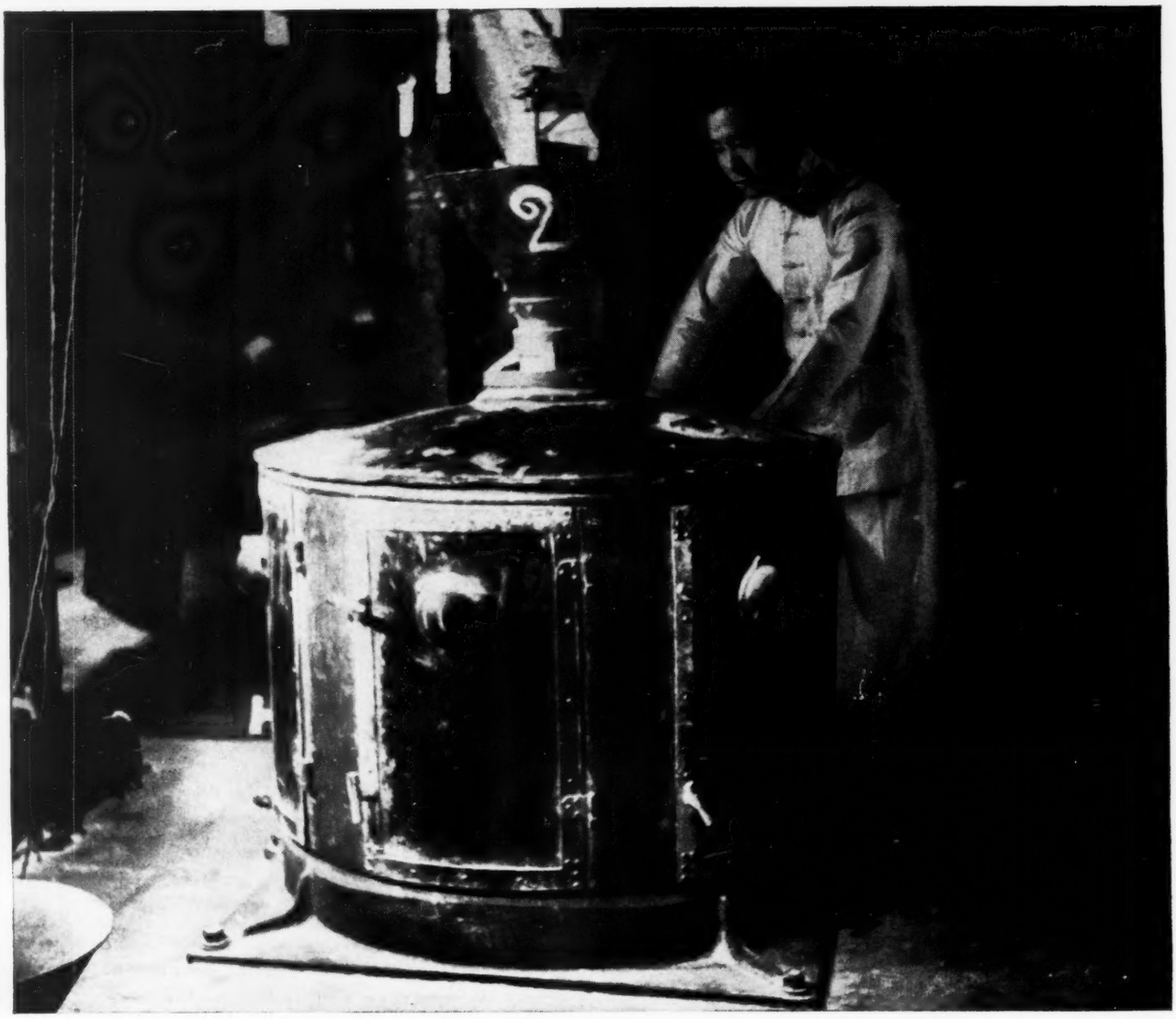
•

Bolts Prevented From Turning By Welding on Extra Nut

"To hold machine bolts in hard-to-get-at places," writes H. W. McDowell, superintendent, Somers Coal Co., Adena, Ohio, "we weld a nut to the side of the square head of the bolt, as shown in the accompanying illustration, in such a manner as to prevent its turning."



Showing how bolts are prevented from turning by welding nuts on one side of the heads.



Polishing two quadrillion grains of rice

A typical example of Goodrich development in rubber

NOBODY seems to know why, but the whole world has always demanded that every grain of rice it eats be polished and shiny. It doesn't grow that way, so how make it saleable?

Years ago someone invented the rice mill—a steel barrel inside which spins an emery wheel. Rice is fed between inner barrel surface and spinning wheel, and comes out the bottom, polished and shiny. But the steel barrel and emery wheel—two hard surfaces—broke too many rice grains which were wasted or, if included, reduced the appearance and value of the rice.

Something softer was needed. Wood was tried; still too hard. Rubber was used but it wore out too quickly. A B. F. Goodrich representative in the Orient asked his company to investigate. Research men in Akron who had never seen a rice field built a sample mill, began experiments. Finally they developed a rubber so tough it lasts longer than the steel barrel, so soft it protects the rice from breakage, yet hard enough so that rice is held against the emery wheel for polishing.

Then, for extra value, B. F. Goodrich engineers developed a way to make the rubber in adjustable sections so that as it does finally wear, the correct clearance can be maintained for longer life.

These B. F. Goodrich rice blocks now polish practically all the world's crop of machine-polished rice, estimated at sixty million tons, 2 million-billion (2,000,000,000,000,000) grains. They are standard in every nation just as many other Goodrich improvements are standard in almost every manufacturing plant here. *The B. F. Goodrich Company, Mechanical Goods Division, Akron, Ohio.*

B.F. Goodrich

First in Rubber

(*Another story of Goodrich development work appears on page 1*)

WHAT'S NEW IN THE FIELD

Compromise Ends Mine Stoppage With $1 Wage Rise; To Dicker on Differential in South

WASHINGTON, D. C., April 28—Agreement tonight by Southern bituminous operators to increase wages $1 a day and reopen the mines brought to an end the Appalachian wage controversy. The Southern producers voluntarily accepted President Roosevelt's proposal to negotiate a new agreement while the miners are at work, the terms of the contract to be retroactive to the date of resuming work. As the Northern operators had previously agreed to increase wages $1 a day the principal point in dispute between the United Mine Workers and the Southern producers is the 40c. per day differential in wages between the North and South.

The compromise arrangement was brought about through the intervention of President Roosevelt, who conferred on the coal dispute all day. Jesse Jones, Secretary of Commerce, acting for the President, persuaded the Southern operators to recede from their previous position against resumption of negotiations.

Mediation Board Fails

With a North-South split in the operators' ranks and separate negotiations getting nowhere rapidly, the stalemated wage controversy was passed on to the National Defense Mediation Board for attempted settlement. A panel composed of W. H. Davis, New York patent attorney, representing the public; Walter Teagle, former president, Standard Oil Co. of New Jersey, for the employers, and Clinton Golden, regional director, Steel Workers' Organization Committee, representing labor, was unable, however, to bring about an agreement with the Southern operators yesterday. Decision to certify the dispute to this new government agency was announced by Secretary of Labor Perkins in the midnight hours of April 23. This action was taken following a second bolt of Southern producers and the refusal of Northern fields to resume operations unless Southern mines also were reopened under terms proposed by President Roosevelt two days earlier.

Government pressure to end the stalemate which had tied up close to 90 per cent of the nation's bituminous-mine capacity since April 1 increased during the closing days of last month. Vanishing stockpiles and banked blast furnaces threatening the success of the national-defense program were responsible for the heat turned on from Washington. Meantime, negotiations for a new anthracite wage agreement, which began in New York on April 8, were still inconclusive, but the union men agreed to continue work ten days during further negotiations.

President Roosevelt's appeal, issued as a White House statement late April 21, was a two-way plea. He asked northern Appalachian operators, who recently had come to terms with the United Mine Workers but had signed no contract, to "resume production under the terms of that agreement." Southern Appalachian producers, who bolted the Appalachian Joint Wage Conference sessions in New York on April 11 and had set up an organization of their own—the Southern Coal Operators' Wage Conference—in Washington, were asked to resume negotiations with the union and reopen their mines under an agreement to make the terms of any contract finally arrived at retroactive. The negotiating committee of the new organization returned to New York the next evening and started independent parleys with union representatives, but returned to Washington the next night.

L. Ebersole Gaines, president, New River Co., is chairman of the Southern Coal Operators' Wage Conference. L. E. Woods, president, Crystal Block Coal Mining Co., is vice chairman. Harry E. Homan, secretary, Big Sandy-Elkhorn Coal Operators' Association, is secretary, and Stanley C. Higgins, secretary, New River Coal Operators' Association, is treasurer. Members of the wage negotiating committee are: L. T. Putman, general superintendent, Raleigh-Wyoming Mining Co.; Mark L. Garvey, Pocahontas Fuel Co.; H. A. McAllister, president, McCall Coal Co., and L. C. Gunter, president, Southern Appalachian Coal Operators' Association. Prior to the split, Messrs. Putman and Gunter were on the negotiating committee of the Appalachian Joint Wage Conference.

According to the Southern group, the break was due to acceptance by Northern operators of the union proposal to wipe out the 40c. differential on day wages (*Coal Age*, April, 1941, p. 118) established for mines below the Mason-Dixon line in the first joint Appalachian contract in 1933. That, declared Charles O'Neill, president, United Eastern Coal Sales Corporation, and a member of the Appalachian committee, and John L. Lewis, president, United Mine Workers, was only part of the story. Abolition of the differential, it was asserted, would add only 3.34c. per ton to Southern costs and this increase would be taken care of in price coordinations under the Guffey act. The proposed elimination of reject clauses in district agreements, they charged, was an important factor in the secession.

No Work Unless South Agrees

Contract terms agreed to by the Northern group, it is understood, call for an increase of $1 per day in day rates at non-mechanized occupations. Mobile loading-machine crews are to receive an increase of $1.40 and the same increase is scheduled for the operator on a conveyor crew. Increases also are to be made in tonnage and other piecework rates in line with previous practices. One week's vacation with a token payment of $20 for the period is granted. Establishment of safety pit committees is authorized. The union also agrees that no more favorable terms will be granted competing districts. It insisted, however, that Northern miners would not work while their Southern brethren were idle.

Before quitting the New York conferences, the Southerners offered an increase of 60c. in day rates—against the $1.40 asked for in the South by the union. They also proposed an increase of 7.2c per ton in shortwall mining machine rates, while the union demands called for 12c. The Southern offer was conditioned upon resumption of operations, with the further understanding that "negotiations to develop a contract to expire March 31, 1943, shall continue without prejudice to any element in the controversy due to the adoption of" this proposal. That offer, stated the Southern group, was ignored by the union and the Northern operators.

After the Southern group moved on to Washington it invited Mr. Lewis to enter

Coming Meetings

- Northern West Virginia Coal Association: annual meeting, May 13, Fairmont, W. Va.
- Sixth Short Course in Coal Utilization: University of Illinois, Urbana, May 21-23.
- Stoker Manufacturers' Association: annual meeting, May 26 and 27, White Sulphur Springs, W. Va.
- Mine Inspectors' Institute: annual meeting, June 2-4, Bluefield, W. Va.
- Illinois Mining Institute: 23d annual boat trip and summer meeting, aboard Str. "Golden Eagle," leaving St. Louis June 6 and returning June 8.
- Mining Society of Nova Scotia: annual meeting, June 24 and 25, Pictou Lodge, Pictou, N. S., Canada.
- Rocky Mountain Coal Mining Institute: annual meeting, June 26-28, Cosmopolitan Hotel, Denver, Colo.

Wide World Photo

Senate committee starts investigation of bituminous mine suspension.

Chairman Truman of the special Senate committee investigating national defense activities notified Messrs. Lewis, O'Neill and Putman to appear before the committee to submit facts with respect to the coal mine stoppage. Questioning by the committee on April 28 brought about a stormy debate. Members of the committee looking over the telegrams sent to leaders are, left to right: Senators Harry S. Truman, Joseph H. Ball and Ralph O. Brewster.

into negotiations with the new organization and also announced that it was asking the Secretary of Labor to certify the dispute to the National Labor Mediation Board. The union ignored the invitation and the Secretary of Labor advised the Southerners to return to New York and resume their participation in the Appalachian joint conferences. This they declined to do and insisted that they should meet separately with union representatives in Washington.

The union demurred for several days to the proposal for separate conferences and maintained that, because of the anthracite and the Appalachian negotiations, any meetings must be held in New York. On April 17, acting, as he said, at the request of the government, Mr. Lewis wired Mr. Putman, as representative of the "coal operators high- and low-volatile mines, South Appalachian area," that the union was willing "to resume joint wage conferences with your group" in New York. After a White House conference with Col. Edward Watson, of the President's staff, on April 22, the Southern operators' committee came on to New York.

Still declining to fill "their vacant chairs" at the Appalachian joint conferences at the Biltmore Hotel, the Southerners set their parleys with the union at the Commodore Hotel, where the anthracite negotiations have been in progress. The North-South break was further emphasized when the Southern group established its official New York headquarters at the New Yorker Hotel.

One day after the suspension became effective, Leon Henderson, administrator, Office of Price Administration and Civilian Supply, issued an order freezing bituminous coal prices at or below those prevailing March 28. This order, it was explained a few days later, "does not prevent a producer from asking higher prices when selling or offering for sale coal to be mined after the mines resume operation and to be delivered after revocation of the schedule."

Further clarification of the price regulation exercised through Mr. Henderson's office came April 16 with a supplement to the order of April 2 "to avert hardship for mines where work has been resumed under retroactive wage agreements during strike settlement negotiations." This modification permitted bituminous sellers operating under such conditions to sign collateral agreements with purchasers. Under such agreements, it was stated, an operator will be permitted to obtain for coal mined after the price schedule is revoked and there has been a substantial resumption of production, "an agreed sum equal to the maximum price set up in the schedule plus the increase in costs necessitated by the retroactive wage agreement."

That the industry, however, can expect to recover only a small part of the increase in minimum prices fixed by the Bituminous Coal Division was foreshadowed by the release of preliminary figures on 1940 costs. These showed that last year's costs were approximately 18c. per ton less than the averages used in fixing present minimum prices. The figures by districts are given in Table I.

No major changes in conditions in outlying districts took place during the month. Except for operations having contracts with the Progressive Miners' union (A.F. of L.), Illinois mines were down and that also was true of Indiana, where the other union has no foothold. Both States had observers at New York earlier in the month. Work continued in the Southwest and in western Kentucky. Most of the Rocky Mountain mines also were working under retroactive agreements.

Acting under the authority of the act of 1939 establishing a State Department of Industrial Relations, Governor Frank Dixon of Alabama appointed a three-man media-

Table I—Changes in Weighted Average Costs

(As reported by Bituminous Coal Division)

District	General Location	Average Cost Used as Price Base	*Changes Reflected by 1938 Costs	*Changes Reflected by 1939 Costs	*Changes Reflected by 1940 Costs
	MINIMUM PRICE AREA No. 1				
1	Eastern Pennsylvania	$2.3887	−$.0709	−$.1870	−$.2475
2	Western Pennsylvania	2.2140	+ .0527	− .1295	− .2220
3	Northern West Virginia	1.8366	− .0461	− .1107	− .1750
4	Ohio	1.9356	− .0211	− .1738	− .2293
5	Michigan	3.6543	+ .2501	+ .1895	+ .2420
6	Panhandle, West Virginia	1.9775	− .1195	− .3509	− .3534
7	West Virginia "Smokeless"	2.1940	+ .0350	− .1105	− .1593
8	South West Virginia–Eastern Kentucky–Northern Tennessee–Western Virginia	2.0301	+ .0178	− .0791	− .1280
	Total Minimum Price Area 1	2.1284	+ .0032	− .1239	− .1812
	MINIMUM PRICE AREA No. 2				
9	West Kentucky	1.5805	− .0844	− .1636	− .1760
10	Illinois	1.7561	− .0407	− .1343	− .1730
11	Indiana	1.6525	− .0668	− .2169	− .2329
12	Iowa	2.7636	− .0659	− .2735	− .3192
	Total Minimum Price Area 2	1.7622	− .0644	− .1810	− .2067
	MINIMUM PRICE AREA No. 3				
13	Alabama	2.4382	− .0002	− .0846	− .1218
	MINIMUM PRICE AREA No. 4				
14	Arkansas–Oklahoma	3.6080	− .1440	− .1872	− .2778
	MINIMUM PRICE AREA No. 5				
15	Southwestern	2.0392	− .1178	− .2060	− .2269
	MINIMUM PRICE AREA No. 6				
16	Northern Colorado	2.5559	− .0028	− .0124	− .1894
17	Southern Colorado	2.7664	+ .0326	− .1314	− .2478
18	New Mexico	3.1519	+ .0375	+ .1972	+ .2160
	Total Minimum Price Area 6	2.7389	+ .0080	− .0824	− .2125
	MINIMUM PRICE AREA No. 7				
19	Wyoming	1.9917	− .0937	− .1299	− .1750
20	Utah	2.4691	− .2459	− .4806	− .4612
	Total Minimum Price Area 7	2.1691	− .1552	− .2623	− .2814
	MINIMUM PRICE AREA No. 9				
22	Montana	1.4851	− .0622	− .1965	− .1755
	MINIMUM PRICE AREA No. 10				
23	Washington and Alaska	3.2247	− .0712	− .1741	− .1351
	Total, United States	2.0884	− .0193	− .1431	− .1865

* The 1938, 1939, and 1940 figures cover mines producing 50 tons or over daily capacity.

tion board to attempt to put Alabama mines, which refused to go along under a retroactive agreement, back to work. Members of the board are: Donald Comer, Birmingham, textile mill operator; Dr. Roscoe C. Martin, University of Alabama; James A. Liscomb, Bessemer attorney, representing the employees.

Warfare again flared out in the Kentucky-Tennessee field on April 15. C. W. ("Dusty") Rhodes, president, and E. W. Silvers, vice president and treasurer, Fork Ridge Coal & Coke Co., were among the victims of a battle between union and non-union men in which four were killed. Local authorities reported that 15 to 20 men from Bell County (Kentucky) mining communities were injured in the fight on a highway close to the mine in Claiborne County, Tennessee. Fork Ridge employees, it was said, were not members of the union and operations were continued after April 1.

Mr. Rhodes also was president of the American Association, a British-owned land and mineral holding company which founded the town of Middlesboro, Ky. From 1918 to 1920, he was superintendent of the Weeksbury mine of the Elkhorn-Piney Coal Mining Co. (now owned by Koppers) and from 1920 to 1925 was an independent engineering and operating consultant with headquarters in Huntington, W. Va.

In view of decisions following the 1939 suspension, thousands of miners idle since April 1 will draw unemployment compensation from the States. Pennsylvania already has announced such payments will be made, and Ohio, presumably, will follow suit, since 1939 payments were upheld by the State Supreme Court a few months ago. No payments will be authorized in West Virginia, as the 1939 case is still on appeal and has not been acted upon by the court of last resort in that State.

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Civil Service Test Announced For Coal Examiners

Inspectors of coal are needed by the War Department for national defense work. The salary is $3,800 a year. The U. S. Civil Service Commission has just announced an examination for these positions. Qualified persons are urged to file applications.

Applicants must have had ten years of experience in dealing commercially, and on a large scale, in coal in bulk greater than carload lots. The experience must have been of a kind that involved inspection of coal in boats, barges or railroad cars for any of the following purposes: storage and consumption on ships; railroad use; use in steel mills, coke plants or industrial plants; or at a terminal where coal is unloaded in bulk for reshipment. The maximum age limit for applicants is 60 years.

Coal inspectors will assist and advise the post quartermaster regarding fuel requirements; will contact shippers in connection with the quantity, quality or condition of coal deliveries, and will inspect the coal in carload lots at the point of delivery.

Applications will be rated as received at the Washington office of the Commission until Dec. 31, 1941. Further information and application forms may be obtained at any first- or second-class postoffice or from the Civil Service Commission.

Better Mine Roofs and Safer Men Under Them Draw Crowd to Pittsburgh Meet

TWO HUNDRED men attended the Mining Session of the Western Pennsylvania Seventeenth Annual Regional Safety Engineering Conference, April 2, Pittsburgh, Pa., under the aegis of the National Safety Council, with Richard Maize, Secretary of Mines, State of Pennsylvania, in the chair. Preservation of roof by paint, gunite and conditioned air; control of dust in mine and means of making the mining force safety-conscious were covered in eleven papers.

Though tests made in an air-conditioned cabinet at the Central Experiment Station are not concluded, results already suggest that paint, though not as good as gunite, because less strong, preserves roof, asserted H. P. Greenwald, superintendent of the station, U. S. Bureau of Mines. In applying paint, one must beware of igniting the highly flammable oil used in its thinning. Once dried, paint is no more combustible than coal.

Describing the work in Oklahoma and Arkansas (see *Coal Age*, May, 1937, p. 219) and in the No. 6 bed in Illinois, Mr. Greenwald said roof must be dry and firm when paint is applied. Humidity increases expand mine rock more than heat increases—sometimes ten times as much—and so may be more injurious. An increase of 0.1 per cent in the length of a rock beam tightly held at its ends will destroy it.

Some think that moisture softens and weakens roof, declared C. A. Herbert, supervising engineer, U. S. Bureau of Mines; others that it swells lime in the shale, thus weakening it; while still others contend that failure is due entirely to expansion and contraction of the roof caused by temperature changes and that moisture deposition in summer is a secondary, or incidental, phenomenon without effect on mine roof.

Assumption that the cause of roof breakage is expansion or contraction can hardly be correct, for, in winter, temperatures may occur 60 to 70 deg. below strata temperature and yet cause little roof trouble, whereas, in summer, with an increase of only 25 to 30 deg. F. above strata temperature, roof will begin to cut and fall.

Coat of Paint Insufficient

One operator has advanced the theory that when the air is warmer than the strata, the outer layers of roof are heated, causing them to expand; during this expansion, the pillars on either side form solid buttresses that prevent lateral movement, thus forcing these outer layers to separate along bedding planes and buckle downward, which seems plausible until the success attained in preventing summer roof falls by applying a coat of asphalt paint to the roof is considered. Certainly, a coat of paint will not afford enough heat insulation to prevent expansion and contraction of these outer layers.

At a mine in Indiana, the shale roof gave much trouble in summer, particularly on intake aircourses, but where a spray of water from a leaking dam kept the roof wet and at a uniform temperature, the latter was undisturbed, although on either side of this point it cut and fell. This appears to disprove the theory that moisture on the roof softens it, causing falls during summer; at the same time it indicates that less trouble will be experienced with the roof if temperature and moisture conditions are kept fairly constant. Only in a new mine where the opening is so near the working faces that the latter are affected by temperature and moisture changes will an air-cooling unit be needed.

In the Pittsburgh area, with maximum humidity and temperature, 7.14 gal. of water at 56 deg. F. will be required to condition 1,000 cu.ft. of mine air. The average quantity will be small, as the average noonday wet- and dry-bulb temperatures at Pitts-

Keeping Step With Coal Demand

Bituminous Coal Stocks

	Thousands Net Tons March 1 1941	P. C. Change From Feb. 1 1941	P. C. Change From March 1 1940
Electric power utilities	10,663	— 4.10	+16.81
Byproduct coke ovens	9,890	+ 0.03	+68.34
Steel and rolling mills	1,040	+11.23	+60.00
Railroads (Class 1)	7,216	+15.73	+36.87
Other industrials*	13,427	— 3.58	+15.23
Total	42,236	+ 0.32	+29.65

Bituminous Coal Consumption

	Thousands Net Tons Feb. 1941	P. C. Change From Jan. 1941	P. C. Change From Feb. 1940
Electric power utilities	4,233	—11.48	+ 0.38
Byproduct coke ovens	6,445	— 8.73	+13.55
Steel and rolling mills	966	— 7.38	+ 7.33
Railroads (Class 1)	7,666	— 6.36	+ 4.61
Other industrials*	11,638	— 7.09	+ 9.19
Total	30,948	— 7.76	+ 7.53

* Includes beehive ovens, coal-gas retorts and cement mills.

Coal Production

Bituminous

Month of March, 1941, net tons	48,250,000
Per cent inc. over March, 1940	36.03
January-March, 1941, net tons	134,015,000
Per cent inc. over Jan.-March, 1940	12.98

Anthracite

Month of March, 1941, net tons	4,596,000
Per cent inc. over March, 1940	21.81
January-March, 1941, net tons	14,005,000
Per cent inc. over Jan.-March, 1940	8.22

Sales of Domestic Coal Stokers Vs. Oil Burners

Sales	Coal Stokers	Oil Burners
February, 1941	5,408	10,684
Per cent inc. over Feb., 1940	48.00	22.23
January-February, 1941	19,738	21,663
Per cent inc. over Jan.-Feb., 1940	40.37	17.50

Index of Business Activity*

Latest week	137.9
Per cent change from month ago	—4.83
Per cent change from year ago	+31.584

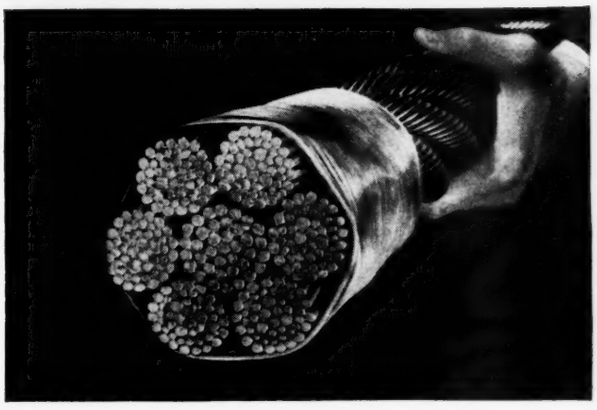
* *Business Week*, April 19.

Electrical Power Output†

Week ended April 12, kw.hr.	2,720,628,000
Per cent change from month ago	—0.034
Per cent change from year ago	+9.125

† Edison Electric Institute.

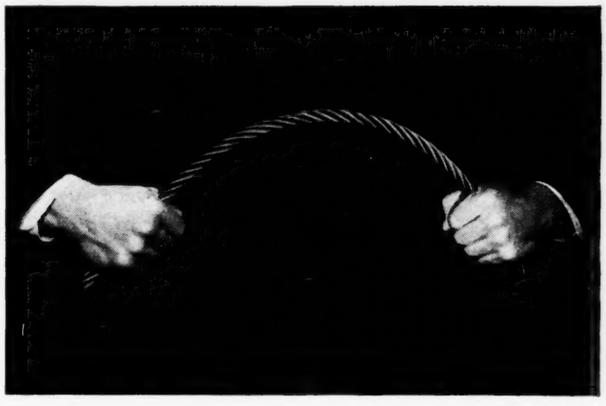
3 REASONS WHY IT PAYS TO BUY BETHLEHEM ROPE



Big ropes that break records

"Two Bethlehem big ropes broke two records in a row on a Florida phosphate dragline." "A Bethlehem big rope surpassed all previous yardage figures on a large Mid-West stripping shovel." Reports like this come in consistently.

Why? Because big ropes are now a Bethlehem specialty. We have installed brand new big rope machines; developed new big rope designs; further tightened up metallurgical control. Try our big ropes on your stripping shovels or in your shafts.



Formset for easier handling

Bethlehem Formset rope is limp, relaxed, easy to splice or spool. Formset requires no seizing at any time. There are no spiny bristles to cut workmen's hands. That's because strands and wires in Formset are preformed into the corkscrew shape they take in the finished rope. They lie in this position permanently, without tending to push inward or fly outward.

Jiffy check-up with Telfax

An identification tape—known as Telfax—is laid next the core of every Bethlehem Wire Rope. This cellophane marker bears the name of the steel in the rope, and also a distinctive identifying color: Purple = purple strand; red = cast steel; green = plow steel and so on. No danger of using the wrong rope on a dangerous job or valuable machinery when you check with Telfax Tape.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

burgh are only 65.2 and 77 deg. F., respectively. At Evansville, Ind., the maximum requirement would be 10.2 gal. of water, and the average daily requirement 33 gal., based on the average temperatures and humidities for July as recorded during a 10-year period.

To satisfy by artificial refrigeration the maximum noonday requirement in the Pittsburgh area, 3.5 tons per 24-hour day of refrigerating capacity per 1,000 cu.ft. of air would be necessary; thus a mine using 100,000 cu.ft. of air per minute would require a plant capable of freezing 350 tons of ice per day. A unit of this size would be extremely costly to install and operate. Remarks made by Charles Jeffers, general superintendent, United States Coal Co., on the use of gunite for the protection of mine roof appear on p. 65 of this issue.

Dust-control experiments at the mines of the Pittsburgh Coal Co. by no means have reached a conclusion, regretted R. H. Nicholas, chief mine inspector. At first, dust counts were made, but later a modified photometric method was adopted which was speedier and for that reason seemed preferable. Several wetting agents were tried. Four or five seemed good, and one was selected for mine tests. Such an agent must not be corrosive. Complaint had been made that too much water had been used to allay dust, making the product too wet to give satisfaction. Use of the drying agent permitted the quantity of water to be cut 65 to 70 per cent or even 90 per cent.

Too much direction by company officials would seem likely to wreck any safety association, judging by the remarks of J. W. Williams, of the personnel and labor relations department, Rochester & Pittsburgh Coal Co. Success in the safety campaign in the Indiana district seemed significantly to parallel the active participation and control of mine workers in Holmes Safety Association work. The president of the Indiana Council of the association is a State mine inspector; another State inspector is vice president; the vice president, Rochester & Pittsburgh Coal Co. is second vice president; a field worker of the United Mine Workers is third vice president and Mr. Williams is secretary-treasurer. In the executive board also are five operator representatives, four labor men, two representatives of the Bureau of Mines, a retired State mine inspector, an inspector for the Department of Labor and Industry and a representative of the Provident Life and Accident Insurance Co.

Subsidiary safety chapters usually have a mine worker for president, vice president and secretary-treasurer (though the last may be a mine clerk). Each has safety, health, education and social directors. Other executive committeemen may number 14, depending on the size of the mine. Usually, there are two mine workers to every company official, and such men are chosen as will make the membership representative of all sections of the mine.

Fatal accidents in mine, district or State are discussed, not for criticism or blame but to seek ways of prevention. To avoid embarrassment, no names are mentioned. A door prize of about $5, for which only mine workers may compete, is awarded by drawings. The first council in Indiana County was founded in 1930. Several chapters were started, but functioned for only a short time, primarily because of the inadequate manner in which the council was organized. Reestablished in July 31, 1935, a rally in the Indiana Fair Grounds followed, Sept. 21, when 1,000 were present. Dominated by mine officials, the safety chapters organized in 1936 progressed slowly, though a banner for the mine having the best frequency record for the previous month, instituted June, 1936, somewhat increased the activity of mine officials. At the close of 1937, despite these efforts, Indiana had "the most disgraceful accident record" it had had for years.

At a council meeting, March, 1938, revolutionary changes were made. The roll call of each chapter was read and members stood up until counted. Competition between chapters soon increased attendance. Each chapter made its report and described its ways of arousing local interest. Entertainment, special speakers and films increased attendance. One mine with 1,000 men had 600 at a chapter meeting. Regular meetings drew 100 to 150 instead of nine, as before. Mine-worker blood was infused into the chapters and council, and union district officers were requested to speak at meetings.

Rapid Improvement Shown

As opposed to the 1937 record of 950 lost-time accidents, including 17 fatalities with 8,714,000 man-hours' exposure, resulting in a frequency rate of 109.02 and a fatality rate of 1.95, the 1938 record showed 563 lost-time accidents, including five fatalities, with 6,625,873 man-hours of exposure, resulting in a frequency rate of 84.97 and a fatality rate of 0.75. In celebration of this record the first safety jamboree was held in the Indiana High School, February, 1939, with an attendance of 1,800. At this meeting, the permanent safety banner was first formally presented, and for two months after the event the lowest frequency rates in the history of the council were experienced.

A first-aid meet in Indiana in August, 1939, with 10,000 present was followed by another low frequency rate, and the first annual smoker at the Indiana County Club, November, 1939, with 142 present, brought in another unusually low-frequency month. In 1939, lost-time accidents had fallen to 425, including seven fatalities with 7,001,359 man-hours and a frequency of 60.70 and a fatality rate of 1.00; the year 1940 had 481 lost-time accidents, including three fatalities, with 8,922,268 man-hours' exposure, a frequency rate of 53.91, and a fatality rate of 0.34. Had fatalities continued as in 1937, 29 more lives would have been lost in the years 1938 to 1940 inclusive.

Visual instruction, declared M. J. Ankeny, mining engineer, safety division, U. S. Bureau of Mines, is better than addresses or rule books for the promotion of safety. Especially helpful is film strip accompanied by sound effects.

A safety bulletin issued by the Hanna Coal Co. in 1930 has been expanded to an eight-page newspaper, declared L. G. Ault, secretary to James Hyslop, general manager, who delivered the address of the latter. The bulletin, which goes to 2,500 employees, compares accident rates per 1,000 man-days worked at the several mines.

A system of broadcasting safety programs has been arranged at the Ebensburg Coal Co.'s No. 1 Mine, at Colver, Pa., using a 30-watt amplifying set that accommodates six loud-speaker horns and that can be operated by a speaking microphone or by an electrically operated turntable for picking up music records, stated Morgan Watkins, safety engineer. The set-up is permanently located in the safety building, 150 ft. from the lamp- and wash-house, with lines running into the lamphouse for two 12-in. monitor-type loud speakers. All programs can be heard in washroom, changeroom and lamphouse and on the hallway leading to the main shaft.

"Be Careful, Buddy" is the slogan of the station, which accordingly is known as the BCB station. This slogan has for some years been used as the greeting between men at the mine, whether officials or miners. The entire program lasts 10 to 12 minuts.

Fatality rates, compensation rates, accident records, physical conditions in the mine—all are better, declared Mr. Watkins. Men take pride in their safety record, so that some who have accidents apologize for them. The music is schottisches or polkas, which the men hum or whistle as they go to work. It puts them in good humor and ready for the foreman's safety instructions. Music gives a grouchy man a good pick-up.

Mine workers' locals should discuss safety and accidents periodically, asserted Harvey Yonkers, international representative, United Mine Workers, so as to keep safety uppermost in their minds and to remind them that no one gains more from safety than they do. That subject should be discussed not only at the Holmes Safety Association chapters but in local union meetings, for, at the mixed meeting, fear of affecting compensation makes men unwilling to expose their own responsibility for accidents. Efforts to prevent company domination of the worker's opinions and his time have made it difficult for officials and mine workers to meet away from the working place, declared W. D. Walker, safety engineer, Butler Consolidated Coal Co., in an article briefed on page 65 of this issue.

"Once a first-aid man, always a safety advocate," said Dennis J. Keenan, State mine inspector, Barnesboro, Pa., and proceeded to outline the best ways of promoting first-aid and mine-rescue work at mines.

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New Warner Officers Named

New officers of the Warner Collieries Co., Cleveland, Ohio, have been named as follows: president, Whitney Warner Jr.; vice president, R. S. Geddes; secretary-treasurer, K. B. Whitworth; assistant secretary-treasurer, W. C. Adams. The executive committee includes Messrs. Warner, Geddes, Whitworth

Asks Coal Division Funds

Following passage of the Coal Act extension bill by both houses of Congress the President signed it on April 11, making control effective until April 25, 1943. The following week President Roosevelt sent a message to Congress asking $3,930,110 for next year's operating expenses of the Bituminous Coal Division.

"We've quit passing the hat at our mines, Jim. The Provident plan takes care of Employees when emergencies arise."

"Wish we had a plan like that. I'm going to talk it over with the others right away."

and this has been going on

for more than a half century!

Thus a satisfied employer tells another

about the Provident HUMAN SECURITY Group Protection program that —without premium cost to the Employer—is aiding Employees meet such emergencies as these

Do your Employees have the benefit of a complete HUMAN SECURITY plan that stands as a safeguard against the financial loss from such emergencies?

Let us show you what such a plan can mean to them — and to you. There's no obligation.

HUMAN SECURITY

- **Death in Family**
- **Death of the Employee**
- **Loss of time through Accident or Sickness**
- **Dismemberment**

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LIFE AND ACCIDENT INSURANCE COMPANY

CHATTANOOGA—Since 1887—TENNESSEE

• Specialists in HUMAN SECURITY (Emergency Income) Plans for over a Half Century •

and K. M. Marquis and G. H. Robertson. For W. H. Warner & Co., Inc., which markets the colliery company output, Karl M. Marquis, for the last 13 years head of the sales department, has been elected president. Other officers are: R. S. Geddes, executive vice president; Whitney Warner Jr., vice president; K. B. Whitworth, vice president and treasurer; and W. C. Adams, secretary and assistant treasurer. Whitney Warner Jr. also is president of the Florence Coal Co.

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Leaders in Coal Research Convene at Battelle

Directors of leading coal research laboratories of the country met at Battelle Memorial Institute, Columbus, Ohio, on March 25 in the first of a series of conferences planned by Bituminous Coal Research, Inc., to insure correlation of the activities of those conducting research on coal. The meeting was by invitation of Howard N. Eavenson, president, B.C.R., who selected Battelle for the initial meeting so that the directors might become acquainted with the program of research being conducted there by B.C.R.

"The time has come," said Clyde E. Williams, director of Battelle, who presided at the conference, "for research to bring to the bituminous coal industry the benefits in improved products and new markets that it has brought to the chemical, metallurgical, and other industries. The leaders of the coal industry today recognize the possibilities of research and are proving their willingness to give it financial support. We who are directing the work must see that we arrange our programs to give the coal industry the results that it needs. Because the industry needs not only applied science but also fundamental research and young men trained as research workers, there is a job for every one of us to do."

In a round-table discussion, each director reviewed in some detail the general type of research and the specific projects under way in his laboratories at present. All were enthusiastic on the possibilities for periodic meetings of this type and each invited the group to his laboratory for a future meeting. A tour of the Battelle buildings, with particular attention to the stove and stoker laboratories, closed the meeting.

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Chemists Assembling at St. Louis Seek Ways To Cleanse Air of Smoke and Dust

SIX ROADS to brighter skies for cities—smokeless coal, smaller coal sizes, better prepared coal, processed coal, fuels other than coal, and electrostatic precipitation—were advocated at St. Louis, Mo., April 8, when the Division of Gas and Fuel Chemistry met with the American Chemical Society, its parent body, under chairmanship of M. D. Curran, president, Coal Carbonizing Co.

Air pollution, unless effectively decreased, eventually will destroy our urban centers, asserted R. R. Tucker, commissioner, smoke regulation, St. Louis. Engineers boast that, in properly designed furnaces, they can burn anything smokelessly. Why, then, be satisfied with solutions that are a mere sop to public opinion? No one denies that, with proper care and attention, high-volatile fuels can be burned smokelessly, but one cannot expect domestic consumers to give the care that hand firing of high-volatile fuel demands. Persons of all ages handle the grates and, in many cases, because of the condition of the equipment or its original design, smokeless operation is impossible.

While, with industrial smoke, no more than 1 per cent of the fuel escapes as carbon, 6 per cent is thus lost in bituminous-coal house fires, and more tar is emitted by domestic fires than by industrial furnaces. Smoke cannot be eliminated unless either the equipment is such as will burn the available fuel smokelessly or a smokeless fuel is used.

All heating devices should be supervised, and kind, type, size and quality of fuel should be controlled. Coal should be clean and fairly free of pyrite. Properly installed small underfeed stokers will burn high-volatile fuel in conformity with the most rigid of smoke ordinances, and in so doing will reduce the fuel bill materially. Frequent firing, such as a stoker provides, enables the furnace to use the entire combustible volatile content of the fuel. When coal is piled in the furnace by hand, the volatile matter largely escapes unburned. Nevertheless, even with a mechanical stoker, firemen may take a bar and level the fire or, anxious, in the morning, to raise steam pressure, may throw coal on the bed and thus make smoke. But whenever a fire is cleaned or started, a little smoke must be pardoned. St. Louis does not make use of low-volatile coal mandatory but the Division of Smoke Regulation will not issue permits for hand-fired furnaces unless the owner declares on oath that he intends to use such fuel.

Anthracite is the only natural fuel in-

Directors of coal research in session at Battelle

Seated, left to right: A. P. Krantz, research professor, department of mechanical engineering, University of Illinois; R. A. Sherman, supervisor, fuels division, Battelle Memorial Institute; N. H. Eavenson; Clyde E. Williams, director, Battelle Memorial Institute; J. E. Tobey, chairman, technical advisory board, Bituminous Coal Research; H. H. Lowry, director, Coal Research Laboratory, Carnegie Institute of Technology. Standing, left to right: E. R. Kaiser, fuel engineer, Battelle Memorial Institute; M. M. Leighton, chief, Illinois State Geological Survey; C. E. Lawall, president, West Virginia University; J. L. Bray, School of Chemical Engineering, Purdue University; H. H. Storch, supervising chemist, U. S. Bureau of Mines, Pittsburgh, Pa.; F. W. Godwin, Armour Research Foundation; A. W. Gauger, director, mineral industries research, Pennsylvania State College; and B. A. Landry, fuel engineer, Battelle Memorial Institute.

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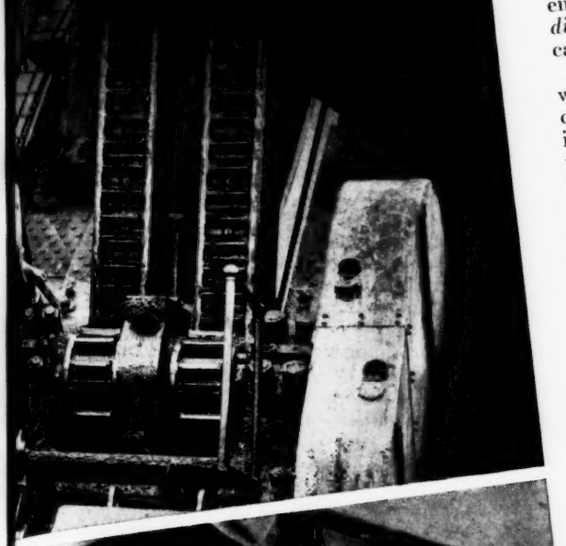

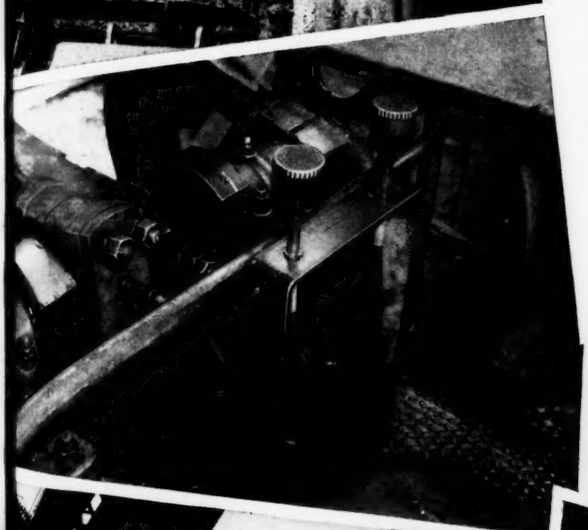

● YES, your mine lubricating problems are "different." Long ago, Standard Oil recognized this, and *did something about it*. Each problem of mine lubrication was given special consideration.

Wherever they were needed, special lubricants were developed. Then, an experienced mine lubricating specialist was located in each mining center in the Middle West. Now, all you have to do to put these special mine lubricants to work saving money for you is to call a Standard Oil Engineer. He'll recommend the lubricant *you* need for the job you pick and make any tests necessary to determine the cost-saving possibilities of his suggestion. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois for the Engineer nearest you.

Here are some of the special lubricants he may recommend:

SUPERLA GREASES

Available in several grades for both high and normal temperature conditions. They've reduced shaker screen eccentric bearing maintenance and eliminated motor and conveyor bearing failures.

SUPERLA MINE LOADER GREASE

Particularly developed for clutch and gear cases on Joy Loaders, to eliminate overheating and reduce consumption. Special oils and greases for other types of loaders and cutters are available.

STANOLIND MINE CAR GREASE

Combines the three important essentials for wheel bearing lubrication; it is heavy enough to *reduce leakage*; and it *seals the bearings* against dirt; *without requiring increased power* to turn the wheels.

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herently smokeless under all conditions of use, declared H. J. Rose, senior industrial fellow, Anthracite Industries Fellowship, Mellon Institute. Despite high population density, the North Atlantic States never have had a smoke problem comparable to those of many cities elsewhere; this, because they burn anthracite. A report from the Office of Production Management, quoted Mr. Rose, estimates a shortage of metallurgical coke of 5,360,315 tons during 1941 and states that this should be met by diverting coke from home and commercial uses (*Steel*, Vol. 108, No. 9, pp. 21-22, March 3, 1941). As a ton of anthracite occupies only about half as much space as a ton of coke, anthracite should be favorably regarded where a shortage of transportation and of storage space hampers defense.

Difference Between Gross and Net Heating Values of Fuels

Fuel	Per Cent
Gas	10
Heating oil	6 to 7
Bituminous coal	3 to 4
Anthracite	2
High-temperature coke (0.5 to 1.5 per cent, hydrogen)	about 1

On burning a ton of anthracite, about 200 gal. of water will be produced, whereas an equivalent quantity of natural or manufactured gas will produce about 300 gal.

Average Annual U. S. Sales of Anthracite in Last Ten Years (1931-1940)

Fuel	Net Tons of Anthracite or Coke or Equivalent Tons Computed From Gross B.T.U. of Oil and Gas
Anthracite (including a small quantity of semi-anthracite but excluding fuel used at collieries for heat and power)	49,800,000
Domestic coke (byproduct and beehive)	8,900,000
Heating oils (grades No. 1 to No. 6 inclusive, for heating homes and commercial buildings)	19,500,000
Manufactured gas (for domestic and house-heating purposes)	4,900,000
Natural gas for domestic and house-heating purposes	13,600,000
Anthracite, 49,800,000 tons. Other fuels, sometimes rated as smokeless, tons.	46,900,000

Sulphur in bituminous coal probably averages 2 per cent, which when burned produces per ton about 60 lb. of sulphur oxides occupying nearly 700 cu.ft., asserted F. E. Vandaveer, American Gas Association Laboratories, for himself and W. L. Jones, St. Louis County Gas Co. Other constituents are silica, arsenic, manganese, iron, and allotropic and polyvalent substances, all of which may have directly or catalytically a deleterious effect. A prolonged smoke fog of several days' duration will kill, it is said, more people than will automobiles in that area in many months.

Smoke cannot be satisfactorily curbed unless formation of smoke in domestic furnaces is restricted. In Salt Lake City, after an active campaign had reduced industrial smoke, these furnaces in 1930 created 85 per cent of the smoke. In January, 1940, St. Louis had 26 hours of thick smog but only 1 hour 15 minutes in January, 1941. Moderate smog in the same periods was manifested for 226 hours and 29 hours 58 minutes respectively. But the smoke ordinance does not apply to much of the suburban area, where 20 to 30 per cent of the houses are heated by gas. In the use of gas, assuming an energy loss in conversion of coal to gas of 20 per cent, 56 per cent of the heat is utilized; with coal used directly only 50 per cent, and by the electricity route only 20 per cent, declared Mr. Vandaveer (quoting A. M. Beebe, *Gas Age Record*, Nov. 14, 1936). In discussion, Mr. Rose said that modern gas furnaces should be compared with modern coal furnaces. One could get 65 to 70 per cent efficiency with modern coal equipment. Detroit Edison Co. gets 91 per cent. Coal has no moisture problem, but in cooler climates, with gas, so much water condenses that plumbers and steam fitters have jurisdictional strikes to ascertain who shall install and maintain drains for this condensate. Gas, usually, does not smoke, but under some conditions it does. Where else do we get lampblack?

Much of the smudge accompanying fog, declared G. W. Penney, Westinghouse Electric & Mfg. Co., is about $\frac{1}{4}$ micron in diameter, and the holes in woven cloth are so large they will not catch these particles. Gases cannot well be reduced by electrical precipitation, because the action involves too much heat and too much ozone.

Submitting estimates for a Hayes carbonizing plant, Guy V. Moody, Pittsburgh district manager, Allis-Chalmers Mfg. Co., declared that "it is possible that a low-temperature coke plant could be built and operated so as to produce coke at a price below other smokeless fuels available in this particular locality." The plant embodies a 20-in.-diameter revolving retort mounted in a furnace and heated externally. To provide long travel and resultant rapid carbonization, a screw conveyor of 16-in. diameter runs along the bottom of the retort. This screw has a forward and backward motion, the forward motion being the greater, so that the coal being coked advances only 1 ft. per minute, though within the retort it has a total travel of 220 ft. As the retort is about 20 ft. long, coke is produced in 20 minutes, but time is varied to suit coal used and to provide the volatile content desired in the coke. Rapid coking and internal quenching in this system enable it to give, Mr. Woody declared, more byproducts than other processes.

Though comparatively high in aromatics and low in benzol, light oil from the Disco Process has much toluol, declared Caleb Davies, Jr., vice president, Coal Carbonization Co. Disco gas liquor contains some carboxylic acids, probably mostly acetic acid, thus exhibiting some slight analogy to the liquors from low-temperature carbonization of coal and wood, but a little lime added to the gas liquor will protect the steel piping from corrosion. The liquor also contains small quantities of other soluble organic compounds, mostly present in much larger quantity in the tar, such as the lower-boiling phenols and some dihydric phenols, but tar is the principal byproduct of the process.

Heated with exclusion of air in a separate operation until its volatile content is reduced to that of high-temperature coke, the principal byproduct of Disco would be a gas with a very large percentage of hydrogen. This is why Disco is much more smokeless than coal of the same volatile content and no less smokeless than some non-homogeneous cokes containing much less volatile matter.

Disco tar products have been successfully used in road tars, wood preservatives, roofing pitch, disinfectant oil, orchard insecticide oil, with no evidence of technical inferiority to older types of tar materials and in some cases with technical advantages. Laboratory indications favor Disco creosote oil for chinch bug barriers in the corn belt, as repellents also of the Jananese- and Mexican-bean beetles and various other pests and as a wood preservative and soil poison for termite control. Disco tar acids appear to have a large place in the plastic field.

On any basis of calculation, asserted C. E. Lesher, president, Pittsburgh Coal Carbonization Co., processed smokeless fuel will cost the consumer more per ton than well-prepared size coal from the same mine. However, even the ordinary stove or house-heating furnace will get greater efficiency from a smokeless processed fuel than from raw coal. With such a fuel, a house will be heated as well as with a smoke-producing

Trucking Unit Moves Heavy Coal Tonnage

Five thousand ton-miles of coal per day is hauled by this Fruehauf dump trailer. This is accomplished by means of a 15½-cu.yd.-capacity body which is used to supply the Ohio Edison Co. of Akron with 100 tons of coal every 24 hours from a strip mine 50 miles distant. The dump trailer is owned by a hauler under contract to the mine, the latter contracting with the utility.

coal, and fewer tons will be needed; the true measure of the cost is the number of dollars spent in a year rather than cost per ton (for method of operation of the Disco plant see *Coal Age*, March, 1939, p. 45).

Four more bituminous coals have been submitted to hydrogenation, stated L. I. Hirst on behalf of R. L. Boyer, A. Eisner, I. I. Pinkel, H. H. Storch and himself, of the Central Experiment Station, U. S. Bureau of Mines, one a high volatile *A* coal from the Upper Freeport bed in West Virginia, one a high-volatile *A* coal from the Black Creek bed in Alabama, a third a high-volatile *B* coal from the Lower Sunnyside bed in Utah, and a fourth a high-volatile *C* coal from No. 4 bed in Indiana. The Lower Sunnyside bed gave the largest yield of 75.3 per cent with only 7.5 per cent of hydrogen absorbed at a temperature of 440 deg. C. and a pressure of 3,300 lb. per square inch.

In almost all smoke ordinances, dense smoke is prohibited except for 6 minutes in any one hour during which the fire is being cleaned or a new fire being built, asserted Osborn Monnett, consulting engineer, Chicago. Intended primarily for hand firing, the exception still remains in force with furnace operation. Hand-fired installations carrying a load of 1,200 sq.ft. of steam radiation or its equivalent or more are rapidly becoming obsolete.

Some have been disposed to shorten the time of No. 3 smoke emission or to prohibit entirely any quantity of smoke recognized as dense. The Ringelmann chart still rules, with all its crudities and its five densities with 20 per cent of difference between them. Thus No. 3 grade, universally considered "dense," is said to be of 60 per cent density.

If a stack makes No. 3 smoke for 6 minutes out of 60 minutes, the smoke density for the hour is 60 per cent x 6 minutes ÷ 60 minutes = 6 per cent. If the stack smokes continuously a No. 2 smoke, which is not prohibited by ordinance, density for the hour will be 40 per cent, almost seven times as much smoke.

Thick yellow smoke from domestic chimneys comes from a comparatively low-temperature fire, in which phenols and other acid compounds are generated which irritate the mucous membrane of nose and throat and predispose to acute respiratory diseases and sinus infections, etc. Sulphur dioxide, which turns to sulphuric acid, also is produced. This corrodes metal work and damages household fabrics. These pollutions arrive at the house at levels where they can readily enter by windows. Better domestic firing methods—coking and alternate methods of firing, starting fires from the top, letting air through the fire door—have been duly publicized, but the campaign died and people forgot. So, in the future, the domestic furnace will come under control, the emission of No. 1 and 2 smoke on the Ringelmann scale, and the quantity of solid products not now classed as smoke also will be limited.

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Alabama Power to Expand

The Alabama Power Co. has filed with the Alabama Public Service Commission for a certificate of convenience and necessity to

construct a 40,000-kw. addition to its steam power plant at Mobile. The initial 40,000-kw. unit, construction on which began more than a year ago, is nearly ready for operation, and the company states that power requirements bid fair to exceed expectations with new business rapidly developing in that section of the State.. The new plant will use coal to generate power.

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Holmes Association Awards Bestowed for Rescues

For heroism and meritorious services performed during 1940, medals and certificates of honor have been awarded to two workers in the coal-mining industry by the Joseph A. Holmes Safety Association, it was announced late in April by Dan Harrington, secretary of the association and chief of the Health and Safety Branch, U. S. Bureau of Mines. Dr. R. R. Sayers, director of the Bureau of Mines, is president of the association. In addition to the heroism awards the association voted to issue certificates of honor to nine mine workers for meritorious deeds, and to 137 individuals and operations that established records for safety over long periods of time.

Medals and certificates were bestowed on Joseph Cannizzaro, Rochester & Pittsburgh Coal Co., McIntyre, Pa., for rescuing, under dangerous conditions, a fellow workman trapped by a large fall of roof; also on Mose Hutchinson, Republic Steel Corporation, Sayreton, Ala., who pulled a fellow worker off a trolley wire with which the victim had come in contact.

Certificates of honor for meritorious acts were awarded to the following:

To Noble D. Alley, J. T. Amason and George Watters, Tennessee Coal, Iron & Railroad Co., Pratt City, Ala., for efficient action in applying first aid to a worker who was caught between a derailed car and the rib.

To J. C. Constable, Consolidation Coal Co., Rivesville, W. Va., for applying first aid to a fellow workman who had been knocked unconscious through contact with an electric wire.

To William Gilleland, Thomas Daugherty, Steve Kurnava, Paul Vardzel and Peter Pluto, of Royal mine, Chestnut Ridge, Pa., for their collective efforts to save the life of a workman who had been caught by a fall of drawslate and coal.

In recognition of performances over long periods without lost-time accidents or low accident records, certificates were awarded to the following:

Walter J. Aston, George Calvert, Vincent P. Crowley, Thomas Curran, Charles Davis, Thomas Davis, John Fitzgerald, James J. Horan, Michael Howard, Peter Mackerall, John F. Masterson, James T. McAndrew, Theodore Morgans, Charles E. Morris, James E. Myrick, William Richards, Andrew Schultz, William Simpson, William Stratford, Clyde Watkins, David Williams, William Williams, Charles Keenan, Karl Miller and Robert F. Patterson, all of the Hudson Coal Co.

C. T. Blake, McKell Coal & Coke Co.

Jim Carson, R. G. Merrill, Tennessee Coal, Iron & Railroad Co.

Michael Coffield, Lehigh Valley Coal Co.

Samuel W. Jackson, Brilliant Coal Co.

Axel Johnson, Union Pacific Coal Co.

A. J. Johnson, Consolidation Coal Co.

John A. Johnson, Northwestern Improvement Co.

Charles L. Jordon, Truax-Traer Coal Co.

Frederick Kinger, Edgar Dale, Elk Horn Coal Corporation.

Jepp Lay, Weeksbury, Ky.
E. E. Morrison, Charles A. Tulley, Norfolk & Western Ry. Coal Dept.
Lew Roach, Lillybrook Coal Co.
Howard L. Townsend, Peter P. Sharon, Industrial Collieries Corporation.
Diamond Waddle, Inland Steel Co.
C. D. Skaggs, Mill Creek Colliery Co.
Elmer Songer, Red Parrot Coal Co.
Chris Ward, West Virginia Coal & Coke Corporation.
Dave Wilson, Vesta Coal Co.
Henry Zwilling, Maryland New River Coal Co.
Thomas E. Davies, Frank Waggett, Buckeye Coal Co.
P. A. Grady, Carrs Fork Coal Co.
Edward Mohn Sr., Bartonville, Ill.
Anchor Coal Co., mines 1, 3 and 5.
Calumet Fuel Co., Somerset mine.
Carrs Fork Coal Co.
Carter Coal Co., Caretta and Olga No. 1 mines.
Chicago, Wilmington & Franklin Coal Co., New Orient mine.
Colorado Fuel & Iron Corporation, Frederick, Crested Butte, Kebler, Morley and Robinson No. 4 mines.
Colorado Springs Coal Co., City mine.
Consolidation Coal Co., Mines Nos. 3, 10, 93, 97, 120, 123 and 204.
Crescent Mining Co., Mine No. 1.
Brilliant Coal Co., Calumet mine.
Diamond Coal Co.
Gay Coal & Coke Co., Gay No. 1 mine.
Glogora Coal Co., Nos. 13 and 15 mines.
Industrial Collieries Corporation, mines Nos. 41, 52, 53, 58, 72, 73 and 91.
Island Creek Coal Co., mines Nos. 7, 11 and 22.
Norfolk & Western Ry. Fuel Dept., Howard and Pond Creek collieries.
Old Ben Coal Corporation.
Peabody Coal Co., mines Nos. 7 and 8.
Princess Dorothy Coal Co., Eunice Nos. 1 and 2 mines.
Pittsburgh Coal Co.
Pursglove Coal Mining Co., Nos. 2 and 15 mines.
W. J. Rainey, Inc.
Republic Steel Corporation, Sayreton mines.
Rochester & Pittsburgh Coal Co., Adrian, Lucerne, Yatesboro No. 5 and Kent Nos. 1, 2 and 4 mines.
Stanley Coal Co., Banner mine.
Stonega Coke & Coal Co., Derby No. 3 mine and Stonega coke works.
Superior Coal Co., Mines Nos. 2, 3 and 4.
Union Pacific Coal Co., No. 1 and "C" mines.
Vesta Coal Co., No. 5 mine.
Westmoreland Coal Co.
Youghiogheny & Ohio Coal Co.
Davis Coal & Coke Co., No. 38 mine.
Elk Horn Coal Corporation, No. 1 mine.
Graden Coal Co., Graden mine.
Hardy-Burlingham Mining Co.
Huerfano Coal Mining Co., Ludlow mine.
Jones Collieries, Inc., Rachel mine.
Kingston Pocahontas Coal Co., Inc., Springton mine.
Koppers Coal Co., Federal No. 1, Helen No. 5, Powellton No. 5, Keystone and Carswell mines.
Mill Creek Coal & Coke Co., Tug and West Fork mines.
Pocahontas Fuel Co., Sagamore colliery, Pocahontas Nos. 7 and 8 mines.
Tennessee Coal, Iron & Railroad Co., Washeries.
Valier Coal Co., Mine No. 1.
West Virginia Coal & Coke Corporation, Norton mine.
Winding Gulf Collieries, No. 2 mine.
Page Coal & Coke Co., Page mine.

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Anthracite Burner Standard Issued

The National Bureau of Standards, Department of Commerce, has issued a pamphlet entitled "Domestic Burners for Pennsylvania Anthracite (Underfeed Type), Commercial Standard CS48-40," which records minimum requirements for material, design and construction, installation, coal storage, conveying and ash removal systems, bearings, lubrication, draft, fans, controls, capacity, workmanship, and flue connections. Operating requirements are set forth, together with methods for determining ratings and efficiency.

The purpose of the standard is to provide a nationally recognized basis for certification of quality and performance by the manufacturer, the installing contractor, or by an

independent inspection agency or testing laboratory. Buyers may also use it as a basis for performance criteria and tests. It is believed that application of this standard will protect users from receiving inferior equipment, and the industry as a whole will be protected against destructive effects following the sale of burners that may cause dissatisfaction as a result of overrating or other improper claims.

The standard records the wording of a manufacturer's certificate and an installer's or contractor's certificate, which are to be placed with each anthracite burner installation and which give certain data and test results pertinent to the particular installation. The pamphlet also records the membership of the standing committee of manufacturers, distributors, and users to facilitate revision of the standard to keep it abreast of progress. Copies of the standard are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5c. each.

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Personal Notes

WILLARD C. ADAMS, formerly with the Koppers-Rheolaveur Co., has been engaged as preparation manager by the Northern Illinois Coal Corporation, with headquarters in Chicago.

ROBERT BEACHAM has been promoted to general superintendent of all mining operations of the Ayrshire Patoka Collieries Corporation, Indiana, including the Fairview mine of the Fairview Collieries Corporation, Fairview, Ill., a wholly owned subsidiary. Operating under direct supervision of J. B. F. Mellville, general manager of Ayrshire Patoka, Mr. Beacham will relieve Mr. Melville of many operating details. Heretofore Mr. Beacham has been superintendent of the Patoka and Ayrshire mines, Oakland City, Ind. He has had extended experience in strip mining, joining the Keehota Mining Co. upon being graduated from high school. He continued with the United Electric Coal Cos. when it acquired the Keehota property. He became superintendent of the Ayrshire mine in 1928 when it was opened by the Electric Shovel Coal Corporation.

C. W. BOONE, Fairmont, has taken over the duties of West Virginia Safety Director, succeeding W. C. Easley. The new incumbent has had extensive experience as safety director for a number of mines, principally in Logan County.

C. R. BOURLAND, previously superintendent of the Kopperston mine of the Koppers Coal Co., Kopperston, W. Va., has been transferred to the Houston division as division superintendent.

LESTER E. BRISCOE has been advanced to superintendent of the Patoka mine of the Ayrshire Patoka Collieries Corporation, Oakland City, Ind., vice Robert Beacham, promoted. He was previously assistant superintendent.

GEORGE CAMPBELL, vice president and general manager of the Old Ben Coal Corporation, has been elected president of the Illi-

nois Coal Operators' Association. He succeeds the late Moses F. Peltier.

D. H. Devonald has been appointed vice president in charge of operations of the Peabody Coal Co., vice Moses F. Peltier, deceased. Mr. Devonald, lately mining engineer, who has been associated with the company for nearly 30 years in various capacities, also has been named to succeed Mr. Peltier as a director of the Illinois Coal Operators' Association.

George M. Disert has been promoted to superintendent of the Ayrshire mine of the Ayrshire Patoka Collieries Corporation, Oakland City, Ind., vice Robert Beacham promoted. Previously he was assistant superintendent.

Howard N. Eavenson, formerly vice president of the Boone County Coal Corporation, Sharples, W. Va., has been made consultant to the president, William J. Clothier.

Evan Evans, formerly operating assistant, Lehigh Navigation Coal Co., Lansford, Pa., has been advanced to vice president and general manager.

E. D. Hanes has been appointed general coal freight agent of the Virginian Ry. effective May 1. The position of supervisor of coal traffic has been abolished.

Claude P. Heiner, assistant general manager of the Utah Fuel Co., Salt Lake City, Utah, since last May, was chosen vice president and a director of the company on April 14. He succeeds the late Reed Smoot, for more than 30 years one of Utah's senators in Washington. The new vice president of the company, which operates three mines in Utah, and two in Colorado through a subsidiary, was formerly a combustion engineer for Utah Fuel. In 1937 he was made assistant to the president of the company. He studied industrial engineering at Columbia University, being graduated in 1926. He is a son of Moroni Heiner, president of the company.

Daniel Cowan Jackling, president, Gallup American Coal Co. and Utah Copper Co., and managing director of mining operations for the Kennecott Copper Corporation, was presented with a certificate of honorary membership in the American Institute of Mining and Metallurgical Engineers on April 17. The citation reads: "For preeminent leadership in the profession of engineering; for encouragement and inspiration to young men beginning an engineering career; for devoted service in building the institute and increasing its prestige." Mr. Jackyling, who was president of the institute in 1938, has been awarded numerous gold medals in recognition of his pioneer work in the mass production of copper from the low-grade porphyry ores of the West.

A. B. Kelley, formerly general manager, Old Basin Connellsville Coal Co., in western Pennsylvania, who was elected last autumn to the U. S. House of Representatives, has been named on the Mines and Mining Committee.

George W. Land, formerly a member of the research staff of the Illinois State Geological Survey, has been named a research

engineer at Battelle Memorial Institute, Columbus, Ohio. He is studying methods of treatment of coal to render it dustless and will be assigned to other investigations in the fuel research division. He has a master's degree in chemistry from the University of Illinois.

MALCOLM MCAVITY was elected president of the Consolidation Coal Co. on April 8, succeeding Robert C. Hill, who remains as chairman of the board. Mr. McAvity became general sales manager of the company eight years ago, being made vice president in charge of sales three years later.

ROBERT MEDILL, State Director of Mines and Minerals of Illinois, has made the following appointments in his department: State mine inspectors—District 1, CHARLES VAN SCHAICK, Spring Valley; District 4, GEORGE HALL, Springfield; District 7, R. R. SCHIBER, Glen Carbon; District 11, GEORGE BAGWELL, Harrisburg; District 13, DRISCOLL SCANLAN, Nashville. Superintendent of mine rescue station at Benton, WALTER ANDERSON, Benton. Civil engineer, ROBERT JEAN, Anna.

THOMAS A. O'HARA, formerly mine foreman at Federal No. 3 mine of the Koppers Coal Co., Everettsville, W. Va., and later sheriff of Monongalia County, has been named an inspector in the State Department of Mines of West Virginia. He will be assigned to the Monongalia-Marion counties sector, according to N. P. Rhinehart, chief of the department.

NEWELL W. ROBERTS has resigned as chief of the marketing branch of the Bituminous Coal Division to become associated with the Berwind-White Coal Mining Co. in New York City.

FRED SAURS, formerly a face boss at No. 6 mine of the Crescent Mining Co., Peoria, Ill., has been appointed State mine inspector for District No. 2, Illinois.

ROBERT WEIR, section foreman at No. 1 mine of the Bell & Zoller Coal & Mining Co., Zeigler, Ill., has been appointed State mine inspector for District No. 10, Illinois.

R. W. WILMOTH, formerly sales manager, Boone County Coal Corporation, Sharples, W. Va., has been made vice president in charge of sales.

A. S. WILSON, heretofore general manager of the Boone County Coal Corporation, Sharples, W. Va., has been advanced to vice president in charge of operation.

GEORGE D. WYANT, formerly general superintendent, Clyde mine, Republic Steel Corporation, Fredericktown, Pa., has been appointed superintendent at the Maiden mine of the Kelleys Creek Colliery Co., Maidsville, W. Va.

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Gildroy Heads Bair-Collins

G. E. Gildroy, formerly vice-president in charge of operations, has been elected president of the Bair-Collins Co., Roundup, mont., succeeding the late F. V. H. Collins. S. M. Wood and R. E. Cooke, both of

G. E. Gildroy, new Bair-Collins president.

Billings, have been chosen vice-presidents, while L. M. Gildroy, Roundup, is secretary-treasurer. The new board of directors, in addition to the above, includes Charles M. Bair.

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Anthracite Advisory Board To Promote Utilization

The Technical Advisory Board of the Anthracite Industry, composed of selected technical personnel of anthracite producing companies and affiliated organizations, held its first formal meeting on April 7 at Philadelphia, Pa. The group elected as chairman J. H. Kerrick; vice chairman, L. N. Burnside, and as secretary, Allen J. Johnson. Headquarters will be at Primos, Pa. Between regular meetings of the board an executive committee will deal with matters currently coming before it and make timely preparation for study and discussion by the board at its regular meetings.

Apart from its purely academic transactions and in recognition of the fact that advance in the technology of product utilization is an essence of competition and, therefore, an important link between product preparation and marketing, particularly in the field of fuel utilization of natural energy resources, this group will principally devote itself to the study and suggested resolution of problems directly related to the fuel use of anthracite. These studies will encompass combustion and control, improvements to existing equipment for and improved methods of utilization.

Findings of the group deemed by it to merit further consideration will be submitted to the industry for exhaustive study and development in laboratory, shop and field. Results from these endeavors will thus facilitate marketing of anthracite and promote profitable expansion of anthracite markets. It is the further purpose of the board to contribute to the common fund of technical knowledge relating to fuel utilization, combustion engineering and practice which has been and is being accumulated through the research and development activities of fuel industries, manufacturing organizations, educational and other institutions and the government.

Wide World Photo

Buried coal comes in handy during coal-mine stoppage.

C. E. Kiningham (left), treasurer, Hegeler Zinc Co., and Gordon Bailey, personnel director, examine coal that was stored under 10 ft. of water for more than 18 years.

Coal Stored 18 Years Ago Tides Over Stoppage

Coal stored 18 years ago—17,000 tons of it—in a pit and covered with 10 ft. of water enabled the Hegeler Zinc Co., Danville, Ill., to keep its smelter working when stoppage of mining at bituminous coal mines cut off shipments. Company executives decided in 1923 to bury a supply of coal for use in the event of an emergency. A pit 35 ft. deep and half a city block square was excavated on the smelter plant property, was almost filled with screened mine-run coal and covered with water to a depth of 10 ft. to protect it from the elements. When uncovered the coal was found in excellent condition after its long submersion.

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Obituary

TRUMAN M. DODSON 2D, 63, vice president of Weston Dodson Co., Bethlehem, Pa., died April 14 following an operation at a hospital in Ann Arbor, Mich. He was graduated from Lehigh University in 1900, joining the coal company immediately thereafter.

CLARENCE O. MORRIS, 47, rescue director for the West Virginia Department of Mines, died April 23 of a heart attack while being admitted to a Welch hospital. He had been an official of the department for 20 years, serving as a safety director and inspector before becoming mine-rescue director.

A. FRED PHELPS, superintendent of Bergoo Nos. 1 and 2 mines of the Pardee & Curtin Lumber Co., Bergoo, W. Va., died April 2 of a heart attack in a hospital at Clarksburg, W. Va.

C. G. HAYS, 61, chief engineer for the Lake Superior Coal Co., Superior, W. Va., died

April 15 either of a heart attack or carbon monoxide poisoning. His lifeless body was found by his wife in a garage at his home; the ignition switch of the car was on and the gasoline tank was empty.

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New Preparation Facilities

AMES MINING CO., Elmo, W. Va.: Contract closed with Kanawha Mfg. Co. for five-track tipple equipment for preparing and loading lump, egg, stove, nut and slack, plus 500-ft. rope-and-button conveyor, headhouse and bin; capacity, 200 tons per hour.

BLACK DIAMOND COAL MINING CO., Blocton mine, Blocton, Ala.: Contract closed with Deister Concentrator Co. for six "SuperDuty No. 7 Diagonal-Deck" coal-washing tables and one six-way-split "Concenco" revolving feed distributor.

BLUE DIAMOND COAL CO.: Contracts placed with W. J. Savage Co. for installation of McNally-Norton vertical pick breaker equipment as follows: Chevrolet, Ky., Type A unit, 100 tons per hour, breaking lump to minus 8-in.; Bonny Blue, Va., Type A unit, 200 tons per hour, breaking lump to minus 10-in.; Eagan, Tenn., Type A unit, 100 tons per hour, breaking lump to minus 6-in.

COLITZ COAL CO., Pottsville, Pa.: Contract closed with Finch Mfg. Co. for 8-ft. Menzies cone separator for cleaning stove and chestnut, with second 8-ft. unit for pea, buckwheat and rice. The two cones have a total feed capacity of 140 tons per hour.

JOHN CONLON COAL CO., Plains, Pa.: Contract closed with the Deister Concentrator Co. for "SuperDuty Diagonal-Deck" coal-washing table.

DAWSON-DAYLIGHT COAL CO., Dawson Springs, Ky.: Contract closed with the Templeton-Matthews Corporation for design of crushing and stoker-coal screening addition to steel tipple being moved in to replace previous plant destroyed by fire. The addition will comprise two single-roll crushers for reducing all sizes over 1-in. to minus 1-in.; vibrating screens for removing oversize; and additional vibrating equipment for separating crushed coal and natural screenings into 1x¾-in., ¾-in.x10-mesh and 10x28-mesh sizes. The entire output of 300 tons per hour can be shipped as stoker coal. Removal of minus 28-mesh will be done by running minus 10-mesh through paddle mixer before discharge onto vibrating screens equipped with water sprays.

ELMIRA COAL CO., Excelsior Springs, Mo.: Contract closed with Deister Concentrator Co. for general-purpose No. 7 "Diagonal-Deck" coal-washing table.

FAIRVIEW COLLIERIES CORPORATION, Fairview, Ill.: Contract closed with McNally-Pittsburg Mfg. Corporation for tipple and cleaning plant with a capacity of 700 tons per hour. The design provides for breaking everything to minus 6-in. and washing it in two McNally-Norton automatic washers, one a compound unit. Facilities also will include three McNally-Vissac down-draft dryers for 1¼-in.x¾-mm. coal, 250 tons per hour, and equipment for producing nine sizes with selective loading of any on five tracks; to be completed about Dec. 1.

HUME-SINCLAIR COAL MINING CO., Tiger, Mo.: Contract closed with McNally-Pittsburg Mfg. Corporation for McNally-Pittsburg

double-roll primary breaker and shaking screens for preliminary raw-coal sizing ahead of existing wash boxes; capacity, 600 tons per hour.

HYDROTATED ANTHRACITE FUEL CO., INC., Lattimer Mines, Pa.: Contract closed with Chance Coal Cleaner for 13½-ft. Chance cone for cleaning egg to pea, inclusive, 200 tons per hour. The installation is being made by the Wilmot Engineering Co.

ISLAND CREEK COAL CO., Holden, W. Va.: Contracts placed with the Kanawha Mfg. Co. for 100-tons-per-hour lump-and-egg crushing installations at Mine No. 1, Mine No. 14 and Mine No. 22; also, Mine No. 20, screening equipment for 1¼x0-in. coal, 250 tons per hour.

LILLYBROOK COAL CO., Killarney, W. Va.: Contract closed with Fuel Process Co. for Kanawha-Belknap chloride washer for stove coal, 50 tons per hour; also with Kanawha Mfg. Co. for McNally-Norton Type B vertical pick breaker with screening arrangement for removing minus 7-in. ahead of breaker, breaking lump to 7-in. or less; capacity, 80 tons per hour.

LINTON-SUMMIT COAL CO., Linton, Ind.: Contract closed with McNally-Pittsburg Mfg. Corporation for McNally-Norton automatic washer for cleaning 6x0-in. coal at new Harmony mine; engineering and erection of new plant being handled by Templeton-Matthews Corporation.

MACALPIN COAL CO., McAlpin, W. Va.: Contract closed with Fuel Process Co. for Kanawha-Belknap chloride washer for stove coal, 50 tons per hour.

PRINCESS ELKHORN COAL CO., Prestonburg, Ky.: Contracts closed with Kanawha Mfg. Co. for 270-ft. run-of-mine belt conveyor, 250 tons per hour; two-unit crushing installation, 300 tons per hour, lump, egg and stove; and sluiceways, hopper, etc., for Link-Belt air-pulsated jig washer, 100 tons of 4x¼-in. coal per hour.

POND CREEK POCAHONTAS COAL CO., Mine No. 3, Bartley, W. Va.: Contract closed with Kanawha Mfg. Co. for crushing equipment for lump and egg, 80 tons per hour.

RED PARROT COAL CO., Prenter, W. Va.: Contract closed with Kanawha Mfg. Co. for crushing and mixing equipment, lump and egg, 100 tons per hour.

SENECA COAL & COKE CO., Catoosa, Okla.: Contract closed with McNally-Pittsburg Mfg. Corporation for two McNally-Pittsburg upward-rurrent thermal dryers for 1x0-in. coal, 150 tons per hour, with preliminary screening of 1x0 from the larger sizes and final screening of the dried product for removal of the minus 10-mesh.

SICKLER COAL CO., Plymouth, Pa.: Contract closed with Deister Concentrator Co. for one "SuperDuty No. 7 Diagonal-Deck" coal-washing table.

SOUTHERN COAL & COKE CO., Boothton, Ala.: Contract closed with Deister Concentrator Co. for two "SuperDuty No. 7 Diagonal-Deck" coal-washing tables with one five-way-split "Concenco" revolving feed distributor.

STEVENS COAL CO., Spring Mountain Breaker, Jeanesville, Pa.: Contract closed with Chance Coal Cleaner for 15-ft.-diameter Chance cone for cleaning broken to pea inclusive, 250 tons per hour, and two 8-ft. square-topped cones, combined capacity 125 tons per hour, for buckwheat Nos. 1 to 4,

inclusive. Staples-Sweeney Mfg. Co. is general contractor and expects to complete the job by July 1.

Truax-Traer Coal Co.: Contracts placed with Kanawha Mfg. Co. for crushing installations for stove coal at mines at Marfork and United, W. Va., each 50 tons per hour.

Windsor Coal Co., Windsor, Mo.: Contract closed with McNally-Pittsburg Mfg. Corporation for addition to present washing plant consisting of one McNally-Norton automatic washer for 1x0-in. coal and crushed pickings, 200 tons per hour.

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Laboratory Facilities at Battelle Being Expanded

Extension of laboratory facilities is in progress at Battelle Memorial Institute, Columbus, Ohio. This expansion, costing about $35,000, is the result of increased research for industry, occasioned partly by the national defense program but mainly by new products research. Eighteen new laboratories and offices, totaling nearly 10,000 sq.ft., are being installed. They will take care of 40 additional research engineers. The majority of these laboratories are in the new laboratory building which was completed about a year ago.

With so much of the nation's industrial plant occupied in defense work, far-visioned executives are planning for the day when that effort will cease, stated Clyde E. Williams, Battelle director. When that time comes, the only outlet for the production capacities of many industries will be the manufacture of essential peace-time goods for normal economic use. Present-day research, therefore, is aimed at the reduction of production costs and the development of new products or the improvement of existing ones to fill the post-emergency gap. As a result, a large part of Battelle's investigations are on these forward-looking projects.

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Industrial Notes

R. G. LeTourneau, Inc., Peoria, Ill., has appointed Walter L. Schump to its advertising staff. He takes over the duties of former assistant advertising manager A. Robert Thomson, who has been promoted to the training division of the sales department. For the last five years Mr. Schump has been associated with the Denver Equipment Co. and the Mine & Smelter Supply Co. in charge of export sales and export sales promotion. Paul R. Miller has been promoted to national copy, his news bureau activities having been taken over by Eugene E. Weyeneth.

Chicago Pneumatic Tool Co., New York City, has engaged James P. Gillies to assist in general sales activities.

Link-Belt Co., Chicago, has elected Ralph M. Hoffman a vice president, delegating to him general direction and supervision of sales. A graduate in mechanical engineering from the University of Minnesota, he joined Link Belt in 1923 as manager in Seattle; was vice-president and sales manager of the Pacific division, 1931–39; and became assistant to the president in January, 1940.

Duff-Norton Mfg. Co. has appointed Samuel J. Bruce, Jr., as sales representative with headquarters at the company's general offices in Pittsburgh, Pa.

Interstate Engineers & Constructors, Inc., Fairmont, W. Va., a new organization, has become manufacturers' representative for the B. F. Goodrich Co., Pomona Pump Co., Arrora Pump Co., Dean Hill Pump Co., Worthington compressors, Gould Storage Battery Corporation and Interstate Pump Co. Harold F. Sergeant, president of the company, was sales manager of the Fairmont Mining Machinery Co. for 14 years.

Raybestos-Manhattan, Inc., Passaic, N. J., has elected H. E. Smith, general manager of the Manhattan Rubber Mfg. Division, a member of the board of directors and of the executive committee. William H. Dunn, secretary, director and comptroller of Raybestos-Manhattan, Inc., has been elected treasurer of the Rubber Manufacturers Association.

Johns-Manville, New York City, has appointed G. A. Barker as manager of its public utility and electrical products department. A graduate of the University of California, he joined the company in 1921 as Pacific division manager of the power products department, later becoming staff manager of the electrical department.

Cincinnati Rubber Mfg. Co., Cincinnati, Ohio, has appointed John Flocker & Co. as distributor of its complete line of industrial rubber products for Pittsburgh, Pa., and surrounding counties.

Okonite Co. and Okonite-Callender Cable Co., Passaic, N. J., has elected Charles E. Brown, Jr., formerly assistant to president, as vice-president. He will remain in charge of the Washington office. Albert F. Metz, treasurer of both companies, has been elected a director of the latter organization. Leland B. Duer, of the law firm of Duer & Taylor, has been elected a director of the Okonite Co. to replace George Murray Brooks, former executive vice president, who died in January.

The Chicago offices of the Koppers Coal Co. and the Bartlett Hayward and Wood Preserving divisions of Koppers Co. are to be consolidated about May 1, with new offices in the Railway Exchange Building.

J. D. Adams Co., Billings, Mont., has been appointed distributor for Bucyrus-Erie ⅜- to 2½-yd. shovels, draglines, clamshell and lifting cranes and Bucyrus-Ruth excavators.

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Return Empty Cable Reels

Wire and cable manufacturers are faced with an acute shortage of shipping reels, spools and cases primarily through failure of busy industries to return empty containers. This shortage is threatening deliveries on vital defense orders. Wire and cable manufacturers are buying and making containers as fast as possible, but even so new containers are not available in adequate

volume for requirements. More containers are needed quickly—therefore all empty reels, spools and cases scattered throughout the country should be returned and put to work at once.

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Permissible Plate Issued

The U. S. Bureau of Mines issued an approval of permissible equipment in March, as follows: Joy Mfg. Co.—Type T2-4P mining-machine truck; two 4-hp. motors, 250 and 50 volts, d.c.; approvals 423 and 423A; March 27.

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Coal-Mine Accident Fatality Rate Registers Marked Decline

Accidents at coal mines of the United States caused the deaths of 66 bituminous and 13 anthracite miners in February last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 41,450,000 net tons, the accident death rate among bituminous miners was 1.59 per million tons, compared with 2.14 in February, 1940.

The anthracite fatality rate in February last was 2.93, based on an output of 4,430,000 net tons, against 5.08 in the corresponding month a year before.

For the two industries combined, the accident fatality rate in February last was 1.72, compared with 2.38 in the second month of the preceding year.

Fatalities during February last, by causes and States, as well as comparable rates for the first two months of 1940 and 1941, are shown below:

Trade Literature

BLOWERS—Roots-Connersville Blower Corporation, Connersville, Ind. Bulletin G-70 covers briefly applications of the company's products, including positive displacement blowers, positive gas exhausters and boosters, rotary displacement meters, liquid and vacuum pumps, centrifugal blowers and exhausters, and inert gas generators.

CABLE-REEL LOCOMOTIVES—General Electric Co., Schenectady, N. Y. Bulletin GEA-3234 describes G-E "sealed-equipped" cable-reel gathering units for "safer haulage in gassy mines."

CAR PULLER—Jeffrey Mfg. Co., Columbus, Ohio. Folder 712-A gives succinct description, with specifications, of the Type 240-A "all-purpose" car puller for coal mines, coal yards, etc.

COAL AND COKE BUCKETS—Blaw-Knox Co., Pittsburgh, Pa. Catalog 1807 is devoted to light- and medium-weight units; two-line lever-arm buckets for crawlers, trucks and locomotive cranes, derricks and whirleys; special high-speed coal tower buckets of the two-line type; and four-rope buckets to operate on bridge and gantry type cranes.

COAL SAMPLER—Sturtevant Mill Co., Boston, Mass. Bulletin 85 tells of the advantages—and the ease—of automatic sampling with the improved Sturtevant automatic coal crusher and sampler. Sectional views and specifications are given.

CUTTING TOOLS AND BLANKS—McKenna Metals Co., Latrobe, Pa. Catalog 41 of Kennametal steel cutting tools and blanks

UNITED STATES COAL-MINE FATALITIES IN FEBRUARY, 1941, BY CAUSES AND STATES

State	Underground: Falls of Roof	Falls of Face	Haulage	Explosives	Electricity	Machinery	Other Causes	Total Underground	Open-cut	Surface	Grand Total
Alabama	1	..	1	..	..	..	..	2	..	..	2
Colorado	..	2	..	..	..	..	..	2	..	..	2
Illinois	3	..	2	3	..	..	..	8	8	..	16
Indiana	..	..	2	..	..	..	..	2	..	..	2
Iowa	1	..	..	..	..	..	..	1	..	..	1
Kansas	..	..	1	..	..	..	..	1	..	..	1
Kentucky	6	..	2	..	..	..	..	8	..	..	8
Missouri	1	..	..	..	..	..	..	1	..	..	1
Ohio	1	..	1	..	..	..	..	2	1	..	3
Penna. (bit.)	5	..	2	1	1	..	..	9	..	1	10
Virginia	1	..	1	..	..	..	..	2	..	..	2
West Virginia	7	..	6	..	..	3	..	16	..	2	18
Total bituminous	26	2	18	4	1	3	..	54	9	3	66
Penna. (anth.)	7	..	2	1	..	..	1	11	..	2	13
Grand Total	33	2	20	5	1	3	1	65	9	5	79

FATALITIES AND DEATH RATES AT UNITED STATES MINES, BY CAUSES *

January-February, 1940 and 1941

Cause	Bituminous: Number Killed		Bituminous: Killed per Million Tons		Anthracite: Number Killed		Anthracite: Killed per Million Tons		Total: Number Killed		Total: Killed per Million Tons	
	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941
Underground:												
Falls of roof and coal	107	69	1.270	0.807	18	19	1.964	2.020	125	88	1.338	0.927
Haulage	41	31	.487	.362	12	5	1.309	.531	53	36	.567	.379
Gas or dust explosions:												
Local	3	1	.036	.012	...	2	.....	.213	3	3	.032	.032
Major	91	5	1.080	.058	...	...	.....	.....	91	5	.974	.053
Explosives	7	8	.083	.094	1	2	.109	.213	8	10	.086	.105
Electricity	7	2	.083	.023	...	...	.....	.....	7	2	.075	.021
Machinery	7	6	.083	.070	...	...	.....	.....	7	6	.075	.063
Shaft	...	...	.....	.....	...	1	.....	.106	...	1	.....	.011
Miscellaneous	6	...	.071	.....	...	2	.....	.213	6	2	.064	.021
Stripping or open-cut	2	11	.023	.129	2	1	.218	.106	4	12	.043	.126
Surface	8	6	.095	.070	2	3	.218	.319	10	9	.107	.095
Grand total	279	139	3.311	1.625	35	35	3.818	3.721	314	174	3.361	1.833

* All figures subject to revision.

lists specifications and prices for five styles of blanks, 28 standard tools, and several semi-standard tools, as well as for lathe and grinder centers supplied with Kennametal nibs.

DIESELS IN MINING—Caterpillar Tractor Co., Peoria, Ill. Booklet Form 6677 portrays accomplishments of diesel products in mines with stories and pictures of operations in nearly every size and type of mine.

ELECTRICAL AND LUBRICATING DEVICES—Trico Fuse Mfg. Co., Milwaukee, Wis. Catalog 50 gives information on how to obtain maximum fuse protection, remove and replace fuses safely, eliminate poor contact between fuses and clips, and lubricate all types of bearing surfaces with modern, visible, automatic oiling devices.

ENGINE-DRIVEN PUMPS — Allis-Chalmers Mfg. Co., Milwaukee, Wis. Leaflet B-6153 illustrates and describes various sizes and types of units applicable to irrigation, coal washing, fire protection and standby service.

HOSE—Manhattan Rubber Mfg. Division, Passaic, N. J. Bulletin 6879 covers all types of Condor Homo-Flex hose, giving technical information and installation pictures.

LOADING MACHINES—Jeffrey Mfg. Co., Columbus, Ohio. Bulletin 753 announces and describes the L-500 high-capacity loader (31 in. above the rail) for low-vein mines. Bulletin 754 is devoted to the Type 43-L Shortwaloader for conveyor mining, which cuts and loads in one operation.

MAGNETIC STARTERS — Trumbull Electric Co., Plainville, Conn. Circular 330 covers a new line of combination magnetic starters available in sizes Nos. 1, 2 and 3. Including a motor circuit switch disconnect and magnetic starter in one cabinet, these combinations are said to be revolutionary in design, having special adaptability for use on motor-driven machines.

METALLIZING—Metallizing Engineering Co., Long Island City, N. Y. Bulletin 42, in addition to giving useful facts on how to save time, labor and expense in production and maintenance work through Metco metallizing, also describes the new Metco "controlled power" metal spraying gun, Type 2E, as well as the standard Type E gun.

MOTOR TRUCK SCALES—Toledo Scale Co., Toledo, Ohio. Folder Form 2416-A cites new structural advantages in its "Truckmaster" and "Truckweigh" units. Detail pictures show structural features of the new self-gaging pivots, suspension assembly, and the seven-lever system with guaranteed 100 per cent end loading.

OIL CIRCUIT BREAKERS — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Descriptive Data 33-220 describes units for starting motors, listing general types of control in the order of their severity on the breaker contacts. Distinctive features, construction, and operation of the breakers are discussed.

OIL FILTERING—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Folder F-8599 depicts the portable system which cleans and dries the oil used in transformers, regulators, capacitors, and similar equipment. Features and advantages are itemized.

PARTS AND SERVICE—Caterpillar Tractor Co., Peoria, Ill. Booklet Form 6635 contains action pictures of tractors and road machines on various types of operations. Separate sections are devoted to the fuel system, general engine construction features, lubricating system, "Hi-Electro" hardening for parts subject to wear, and pictured models and types of products manufactured by the company.

PILLOW BLOCKS AND BASE PLATES—Link-Belt Co., Chicago. Booklet 1882 covers the company's line of welded steel base plates for adjusting pillow blocks and common flat boxes for shaft alignment. Dimensions, weights and prices are given.

PNEUMATIC MINING TOOLS—Independent Pneumatic Tool Co., Chicago. Catalog 42 contains complete descriptions of Thor rock drills, paving breakers, clay and trench diggers, sump pumps, saws and associated air tools. It points out important construction features and specific applications for the various tools.

PORCELAIN INSULATORS — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Descriptive Data 39-600 discusses and compares dielectric and mechanical strength, heat shock resistance, and dimensional fidelity of Prestite to wet and dry process porcelain; photomicrographs show texture of all three. Applications are listed.

PORTABLE SUBSTATIONS — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Bulletin B-2281 delineates units to meet a wide range of operating conditions, available in all voltage ratings up to 69 kv. and in capacities up to 4500 kva. Engineering details such as core and coils, heat exchangers, and automatic protection are explained.

PULLEYS—Reeves Pulley Co., Columbus, Ind. Folder tells how completely automatic variable speed control can be accomplished by means of Reeves hydraulic automatic control in connection with the Reeves variable speed transmission.

SCRAPERS AND BULLDOZERS—R. G. LeTourneau, Inc., Peoria, Ill. Bulletin Form G-1045 explains the LeTourneau way of coal handling, contrasting it with former methods.

SCREENS—Hendrick Mfg. Co., Carbondale, Pa. Booklet gives details of construction and operation of a new screen with two distinct actions—shaking and whipping. Concise descriptions of units for sizing and dewatering are supplemented with halftone illustrations, drawings of specifications and dimensions of standard sizes.

SLURRY AND SLUDGE PUMPS—Lawrence Machine & Pump Corporation, Lawrence, Mass. Bulletin 207-2 describes centrifugal pumps developed especially for pumping liquids containing abrasive solids in suspension. Specifications and illustrations are given.

STORAGE-BATTERY LOCOMOTIVES—Goodman

Mfg. Co., Chicago. Bulletin MH404 is a profusely illustrated brochure citing the features and advantages of Mancha's Little Trammer, which, though small in size, is said to be powerful, reliable and safe—suitable especially for narrow, crooked drifts.

SWITCHES — Micro Switch Corporation, Freeport, Ill. Catalog 60 gives complete engineering data on precision snap-action switches, including dimensions, operating characteristics, and information as to their use.

SYNTHETIC RUBBER—B. F. Goodrich Co., Akron, Ohio. Bulletin gives detailed description of the properties of Ameripol as they relate to mechanical rubber goods products.

TESTING SIEVES—Newark Wire Cloth Co., Newark, N. J. Folder emphasizes advantages of Newark testing sieves for accuracy, listing specifications. "End-Shak" testing sieve shaker also is described.

TRAMMER—General Electric Co., Schenectady, N. Y. Bulletin GEA-2345A lists features of the 1½-ton trammer locomotive for safe, low-cost haulage.

V-BELT DRIVE APPLICATIONS—Fort Worth Steel & Machinery Co., Fort Worth, Texas. Data book contains detailed information on Boltrim rims and Goodflex multiple V-belts as well as data on such things as ratios, load capacities, friction losses, etc.

V-BELTS—Manhattan Rubber Mfg. Division, Passaic, N. J. Condor V-belt engineering data book has been revised to include horsepower specifications recently adopted. The book is divided into two parts. The first part covers standard drives, eliminating the necessity for working out calculations; the second part covers sheave factors and other data for designing new or special drives.

LETTERS

To the Editor

I should like to add by recommendation to the many others which you are receiving that Eugene McAuliffe be nominated president of the American Institute of Mining and Metallurgical Engineers.

Mr. McAuliffe has had an outstanding career as president of the Union Pacific Coal Co. He has been a pioneer in the efficient use of coal as a fuel for railway locomotives. His personality and executive ability are those of a leader who would guide the institute well during the difficult times ahead.

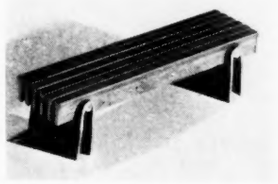
I know of no better man to recommend for this honor at this time. You are doing the A.I.M.E. and the coal industry a great service by helping to organize support for the nomination of Mr. McAuliffe, the choice of the A.I.M.E. Coal Division.

E. R. KAISER
Battelle Memorial Institute
Columbus, Ohio

WHAT'S NEW IN COAL-MINING EQUIPMENT

WEDGE-BAR SCREEN

Wedge-Wire Screen Co., New York City, offers the new "Tru-Slot" wedge-bar screen with U-holer supports assembled in the body of the screen. Special assemblies, according to the company, are available for use with vibrating as well as shaking and stationary equipment. Openings from 0.006 to 1 in. are available, as well as any material or alloy and various wire sizes and wire profiles—non-blinding as well as



corrosion- and abrasion-resisting. U-holders may be spaced as desired and can extend any depth below the screen, depending upon carrying requirements. Sidebars or angles of any specifications may be used.

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FLUORESCENT LIGHTING

A new lighting unit to utilize the extra light advantages of the new 60-in. fluorescent lamps and embodying a new Stream-Flo development to provide for ceiling illumination is offered by the Benjamin Electric Mfg. Co., Des Plaines, Ill. The new unit, known as the RLM "Stream-Flo 60," is available with a series of apertures in the top of the reflector directly over each fluorescent lamp. These openings permit about 2½ per cent of light output to pass upward to relieve contrast between lighted areas of the room and the ceiling background. By utilizing the new 100-watt 60-in. fluorescent lamps, this unit extends the scope of practical fluorescent lighting applications by providing the higher levels of illumination required in many industrial locations.

The company states that by providing widespread light distribution, the unit assures good illumination on both horizontal and vertical surfaces with minimized glare and shadow. Because of greater diameter and length, the 60-in. lamps used in this unit have only about 25 per cent more surface brightness than 48-in. lamps, yet produce twice as much light.

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NEW TRANSFORMER STEEL IMPROVES EFFICIENCY

"Hipersil," a new high-permeability silicon steel stated to have one-third more flux-carrying capacity than the best conventional silicon steel, is now available to reduce size and weight and cut the copper losses in distribution transformers manufactured by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Developed jointly by Westinghouse and the American Rolling Mill Co., Hipersil carries the increased flux with no increase in magnetizing force and therefore the losses are no greater. In addition, according to the company, the magnetostriction, or sound-producing property, of Hipersil is reduced so that increased magnetic flux causes no increase in sound level.

Use of Hipersil, it is stated, reduces the weight of distribution transformers 20 to 25 per cent; improves voltage regulation, especially in the smaller units, and thus permits carrying a larger load with the same maximum regulation; decreases the copper losses some 10 per cent, thus reducing the quantity of heat generated in the winding and raising the short-time overload capacity; and facilitates maintenance because Hipersil cores for single-phase equipment are assembled in two pieces which readily may be taken apart for replacement of the coils in case it becomes necessary.

Although there is no theoretical limit to the size of unit in which the Hipersil core can be utilized, plant facilities so far have been developed only for sizes up to 200 kva. In the case of power and instrument transformers, on the other hand, the size, according to the company, is unlimited.

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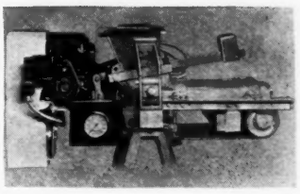
WEIGHT RECORDING FEEDER

Hardinge Co., Inc., York, Pa., announces a new weighing feeder which incorporates a direct recording and totalizing attachment. The new feeder uses the principle of a compensating balanced belt on a pivoted frame, which has proved accurate though simple.

In the present design a method has been developed whereby the feeder is calibrated to read direct in tons, pounds or kilograms, as the case may be, which reading is registered by a pointer on a meter. On this same meter are two weight recording registers, one recording the total accumulated weight and the other being a reset register which will record batch or time runs. The



same system may be employed for use when the feeder is to be controlled remotely, and the recording instruments may be placed on a panel any distance desired from the feeder. The feed rates of various sizes of these feeders range from 2 or 3 lb. to 2,000 tons per hour. The size of feed ranges from fine products to pieces as large as 12 in. in diameter.

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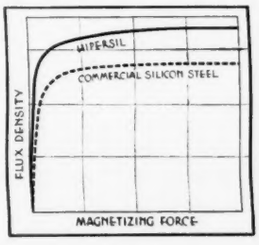
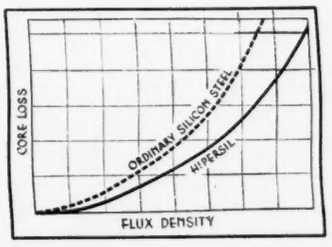
METALLIZING GUN

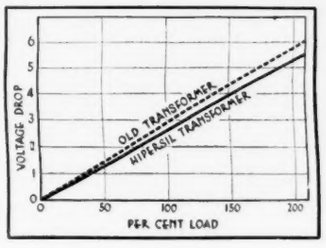
For applying a zinc coating to conveyors, coal cars, mine doors and electric motor housings to resist corrosion and for building all types of worn bearings, pump plungers, shafts and rotors, armature shafts and other worn equipment of all kinds the Metallizing Engineering Co., Long Island City, N. Y., offers the Metco Type 2 metallizing gun.

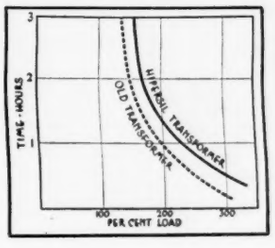
A "controlled power unit" gives uniform and steady wire

feed for production service and eliminates need for gear changes, and "universal gas head" allows the use of acetylene, propane, hydrogen, natural or manufactured gas with balanced pressures and without changing heads. The controlled power unit controls the wire speed by means of a governor, operating on the power-absorption principle, thus allowing full power input at all times and eliminating speed fluc-









tuations under varying loads and the necessity for changing the gears in the gun.

Extremely fine coatings are obtained at production speeds. Improved nozzle and jet construction reduce gas consumption and result in the required deposit with maximum efficiency and economy.

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BARREL AND DRUM TIPPER

Lewis-Shepard Sales Corporation, Watertown, Mass., offers a tipper for safe handling of barrels and drums. This simple device consists of a strong handle with a pronged collar which is adjustable to fit all types of drums and large- or small-bilged

barrels. The long handle increases the leverage so that much less effort is required to handle barrels or drums than in the ordinary manner without the tipper.

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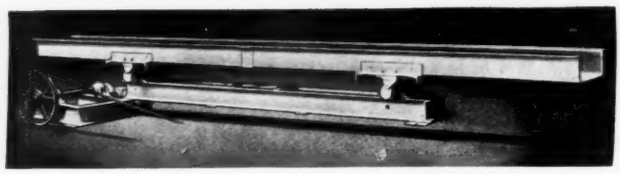
CONVEYOR AND FEEDER

A new vibrating conveyor and feeder known as the Free-Flow is offered by the Standard Transmission Equipment Co., Los Angeles, Calif. It operates on the lift-throw principle with the motion of the trough becoming increasingly horizontal with the progress of each cycle, thus imparting to the conveyed material a gentle forward motion. This motion is so designed as actually to suspend the mass in the air with only momentary contact with the trough on the upward period. This suspended float action minimizes wear from abrasion, and the most fragile material can be conveyed without fear of breakage.

The trough is self-aligning, without the use of chains, flights, etc. The oscillating arms which actuate the Free-Flow trough are mounted in special rubber bushings which store the forward and return forces, thereby reducing power consumption to the minimum. Self-aligning precision ball bearings are used throughout. The trough can be of any desired material, open or inclosed for the handling of hot gaseous or dusty materials. By means of variable speed control of the rate of oscillation of the



trough, volume can be controlled as desired, and the material can be conveyed up inclines to 15 deg.

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ADJUSTABLE-SPEED A.C. DRIVE

Designed especially for applications requiring smoothly adjustable speeds over wide ranges with constant torque, in locations where only a.c. supply is available, a new 10-to-1 adjustable-speed drive, which uses a series circuit without the usual exciter, is offered by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. It is available in ratings from 1 to 15 hp. with a standard speed range from 175 to 1,750 r.p.m. for 2- or 3-phase operation on 220-, 440- and 550-volt, 60 cycle systems. Where a.c. power is not available, the generator may be belted or direct-connected to any suitable prime mover.

The new drive consists of five parts, namely: (1) a single-unit motor-generator set which is a squirrel-cage motor driving a series d.c. generator that supplies operating voltage for (2) a d.c. series motor coupled to the driven load. In parallel with the generator series field is (3) a rheostat which adjusts the driving-motor speed. Control is by (4) an across-the-line starter for the squirrel-cage motor, and (5) a pushbutton station.

The new drive is more flexible than a wound-rotor motor and is more efficient than the conventional variable-voltage system because it has no exciter rotational losses. High-torque characteristics of the d.c. series motor are combined with the flat-speed properties of the shunt motor to give good speed-torque characteristics. It is not intended to replace conventional drives for applications requiring fast reversals, regenerative braking or accurate stopping.

Optional features include dynamic braking, and inching, and no external braking resistor is needed as the braking field is wound into the rotor. The only extra equipment needed is an auxiliary braking contactor mounted near the a.c. motor starter and electrically interlocked with it. Horsepower ratings are based on a top speed of 1,750 r.p.m. at 40 deg. C. continuous operation. Open frames are standard and splashproof and totally inclosed frames are available.

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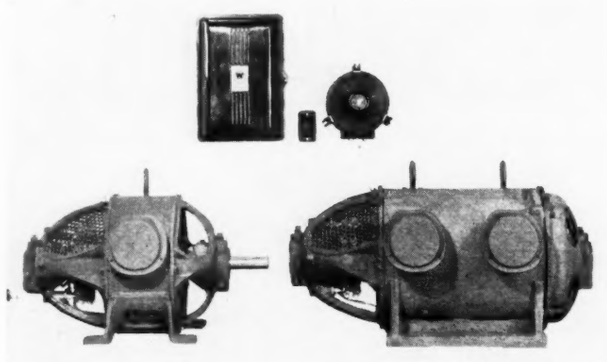
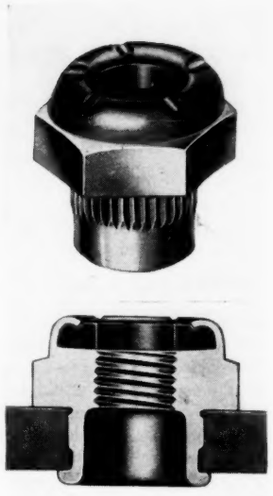
ELASTIC STOP NUT

For fastening sheet-metal assemblies in which the parts must be readily removed and returned to position, a clinch type of self-locking nut with knurled shank is offered by Elastic Stop Nut Corporation, Union, N. J. To install the nut, a hole is drilled in the structure and the shank is pressed into the hole. The mouth of the shank is then spread against the back of the structure to effect a clinching hold. The knurling engages the drilled surface and thus assists in eliminating any turning of the nut.

The head of the nut is fitted with a vulcanized fiber collar, which, being unthreaded, resists the entrance of the screw, thus automatically taking up all thread play and bringing the load-carrying thread faces of nut and screw into a tight pressure-contact. As the screw thread impresses its way through the collar, this pressure is maintained and increased to such a degree that the screw cannot work loose, even under the most





severe vibration. Because of the resilient character of the fiber collar, the screw may be removed and replaced repeatedly without loss of the locking action. These nuts are available in a complete range of sizes, thread systems, shank lengths and materials.

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POWER SCREWDRIVER

A new device which is said to increase greatly the already established efficiency of power screwdriving is announced by the Independent Pneumatic Tool Co., Chicago. Known as the Thor "Pix-Up" finder and Adjusto-Tray, this device picks up and holds screws for driving.

A quantity of screws is spilled into the tray; shaking the tray a few times suspends the screws in slots by their heads. Then a power screw driver equipped with the "Pix-Up" finder is placed over a screw head, pressed

and, as the tray depresses slightly on its spring mounting, the finder grips the screw head firmly in perfect alignment, holding it ready for the driving operation. The operation is not magnetic but entirely mechanical—the finder being split to act, in effect, as mechanical "fingers" in picking up and holding the screw.